SOLDIERS OF PROGRESS AND INDUSTRY

JOHN R. HORNADY

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WILLIAM PATRICK LAY

From a painting by Roderick D. MacKenzie

SOLDIERS OF PROGRESS AND INDUSTRY

By

JOHN R. HORNADY

Author of

THE BOOK OF BIRMINGHAM

ILLUSTRATED

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SOLDIERS OF PROGRESS AND INDUSTRY

CHAPTER I

RECOGNITION OF SERVICE

In history, as it has been warped by the mistaken notions of tradition-bound men, Napoleon ranks as one of the most colossal figures of all time. Yet Napoleon in his world-wide activities never performed but one notable service of a constructive nature and this he did by inadvertence!

This single constructive act was consummated with the sale of the Louisiana Province to the United States, and it was done, not primarily for the fifteen million dollars involved, but to defeat England, into whose hands the vast territory was about to slip.

In delivering the land to the United States, Napoleon contributed to the erection of this great nation and therefore performed a notable act, for had England obtained the territory there is every reason to believe that today there would have been a Dominion, like that of Canada, on the Western half of the North American Continent, with the Stars and Stripes confined largely

to the territory East of the Mississippi River.

So the great Napoleon rendered one conspicuous service in the world at large, but this is not the reason for the halo that has been caused to burn about his head. It was his achievements in war—in the destruction of human life and in the subjugation of human beings, that caused him to become almost deified by the historian.

And what is true in reference to Napoleon is true also of many other warriors whose names have been graven upon the pages of history and whose acts have been magnified and glorified—held up before the youth of all ages as worthy of emulation. To be a mighty warrior has been set forth as the supreme end to which the ambitious might aspire, and it is no wonder that the war spirit has been kept alive, in spite of the great advances of civilization.

As a matter of course, many of these military geniuses have been inspired by high devotion to noble ends, but it is not the devotion nor the worthy end that has been glorified; it has been the skill displayed in the destruction of mankind; the genius exhibited in the performance of colossal feats of slaughter.

For century after century, generation after

generation, historians have devoted their best efforts toward kindling imagination of youth by picturing war as the greatest of all human spectacles, and, consciously or unconsciously, conveying to them the thought that the road to fame lies along a pathway strewn with whitened bones, flanked with charred and broken cities, and red with the blood of human beings.

The story is told of a mother, all of whose sons went to sea and some of whom were lost. In her grief she bewailed the fate that had led them to the sea and declared she could not understand it. A friend, pointing to a picture above the mantel, exclaimed "There is the explanation." It was a picture of a full-rigged ship, with white sails spread to the breeze, the trim hull sailing smoothly through the glorious waves, and the blue sky bending softly above—a magnificent scene, every touch of the artist's brush lending color to the charm of the ocean and the faultless beauty of a perfect sailing vessel. And that was the answer! Throughout childhood and youth those boys had seen this picture and so had been drawn to the sea by a glorification of its beauty that revealed nothing of its sordid, hard and sacrificial aspects.

And so it has been with war. The picture of it, wrought into magic patterns by the skill of the historian, has been held before the youth of every generation, and still men and women occasionally are heard to wonder that to obtain so sweet a thing as peace seems quite impossible!

If the trend is to change, the picture must change. The historian must show war in its true colors—a sordid, horrible and soul-embittering business—and the dauntless ambition of the youth must be turned into other directions. And how easy it would be to turn this ambition, were the purpose to become general!

There are so many magnificent achievements, wrought by men, that historians might glorify; so many accomplishments that point the way to usefulness and fame, that might be chronicled with something of the fervor that has been imparted to the chronicle of conflict.

The man who first conceived and brought forth a wheel performed a greater service than Napoleon ever rendered with all his mighty legions. The men who contrived means for putting the wheel in motion by mechanical means, achieved more than all the soldiers that ever trod the soil of the Empire that was Rome, and

did it without robbing one mother of her son or intentionally crushing the life out of a single human being.

That is the difference between construction and destruction, and it is high time that construction became the aim of the historian and the school; high time that the school room ceased to be an incubator of human conflict.

Still paying the frightful toll exacted during the World War, when the effect of the glorification of conflict through the school reached its flower, the world today turns toward peace. The President of the United States, the Prime Minister of England, and many other great leaders, are reaching forth in an effort to find some solution to the problem of maintaining harmony among men, yet find it infinitely difficult; the difficulty being due to the reasons referred to. Change—and peace—will follow a change in the system under which the mental attitude of the youth will be turned in a new direction.

Nor does this change mean the introduction of a silly form of pacifism. It means simply to tell the story of human conflict as it exists, emphasizing the ghastly facts instead of glorifying the acts of slaughter and deifying the men who

made slaughter a specialty. Glorify the willingness to sacrifice for right, of course, but magnify the principle of obtaining right by reason rather than by relentless slaughter. In brief, put an end to the horrid business of inspiring youth to war for war's sake—give the young man something else to think about as he plans for the future and feels the urge to achieve large things.

No greater contribution may be made to the movement for peace and understanding among men than to implant in the mind of the youth the grandeur of accomplishments that make for human progress and human happiness; to emphasize over and over and over again, from generation to generation, that achievements such as those of Edison, with their measureless benefits to countless millions of people, are infinitely greater than those of all the Napoleons that ever strutted forth upon campaigns of subjugation.

Educational programs pitched upon a level of this character would not only create a condition under which war would become wellnigh impossible, but would lend wings to progress; would create conditions under which much

Birthplace of William Patrick Lay, on Coosa River in Cherokee County, Alabama; erected early in the past century by his grandfather, John Lay.

of the genius and energy that has been turned toward war would be diverted in the direction of constructive achievement.

It is, of course, absurd to assume that by emphasizing the works of men like Edison, every youth would mature into an Edison; just as it is true that not every youth who is inspired by the glorification of Napoleon is converted into a military genius. But it is vastly better to have great armies of young people striving to be Edisons—or to accomplish something infinitely worth-while for the benefit of mankind, than to have them aspiring to be Napoleons, who never accomplished anything worth-while save in exceptional instances.

There is no expectation in the heart of the writer that this work will achieve much along the lines indicated, but in it an effort has been made to offer some incentive to achievement along constructive lines. It attempts to chronicle certain facts that have an intimate relation to human progress, and if in following the recital of these facts, the reader is led to the conclusion that here are ends worthy of achievement, and there is kindled in the heart of youth a desire

for emulation in these fields of high endeavor, for the upbuilding of mankind, then hope will have been fulfilled.

Power has been made the subject of this work because it is one of the most vital elements in human progress, and the man whose works are more particularly described was selected as one whose life affords a brilliant example of devotion to the ideal of service; an apt illustration of the boundless opportunities that await the purposeful, aside from the fact that he achieved results which added vastly to the wealth of the nation and lightened enormously the physical labors of human beings.

The man to whom the writer refers is Captain William Patrick Lay—the first to vitalize the idea of co-ordination in the improvement of waterways, co-ordination meaning the development of navigation, the storage of waters as a means of flood control, and the generation of hydro-electric energy.

Captain Lay not only conceived, but he executed, building structures of colossal proportions with little to begin with other than faith and the willingness to labor and sacrifice in behalf of an ideal.

Born in 1853 on the Coosa River, to which he gave so much of his life, Captain Lay reached maturity and came upon the scene of action at a time when the South still was prostrate as the result of the colossal losses sustained by the War Between the States; when it still was suffering greatly from the loss of man power and the overthrow of its economic system, which had been based upon slave labor; a time when the utilization of natural resources, the development of new sources of energy and the creation of increased transportation facilities were imperative if the people were to escape the tremendous hardships under which they labored.

Of tirelessly inquiring mind, and possessing a large measure of physical stamina, Captain Lay set about very early in life familiarizing himself with the physical conditions of the South. It is doubtful if any individual ever covered more miles afoot in search of facts bearing upon industrial resources. He raked the hills and valleys of Alabama and North Georgia as with a fine-tooth comb, plunging into dense growths and over mountains where scarcely a trail was to be found. Up and down he went, year after year, examining mineral deposits, noting water

courses and their relation to navigation, observing suitable sites for dams and for reservoirs where waters might be stored, and making estimates as to cost of improvements and probable output in power.

It was thus that Captain Lay gained that vast fund of information which made it possible for him to bring about the developments which ultimately were to attain colossal proportions. Thus it may be seen that it was in no easy school that he learned the fundamentals which equipped him for leadership in the great work of providing the facilities that were essential to the economic rehabilitation of the South.

For his own inspiration Captain Lay had coined the phrase "Raw materials, energy and transportation are the three principal factors in all industrial progress," and with full knowledge of the existence of the raw materials, he gave himself unreservedly to the task of providing the essential elements of power and transportation. All about him he saw the evidence of natural wealth—iron, coal, marble, lime, clay, graphite, ochre, beauxite, mica, pyrites, barites, hardwood, pine, and so forth, in almost endless quantity and variety, all awaiting the magic

touch of power and transportation to quicken them into agencies of economic independence; and in the unharnessed waterways he saw the means to the perfection of the great trinity he had in view.

In preparing for the work before him, he drank deeply at every fountain of useful knowledge that he could find. He cared little for books of a purely entertaining nature, but devoured philosophical and scientific works, seeking at every turn to gain knowledge that would be useful to him in carrying on the work to which he had unconsciously dedicated his life.

Minerals, their sources and uses; energy, its history and its multitudinous manifestations; transportation, how developed and how applied. These things absorbed him, as did the political and economic questions relating thereto. He went into the complex questions involving individual rights, the rights of the State and the rights of the nation as they relate to the utilization of raw materials, the development of power resources, and the opening of natural channels of transportation.

The knowledge gained as he applied himself to these varied subjects became of inestimable

value when the time arrived for him to carry into execution the plans of development that had matured as he went along. Whether the subject was the opening of a coal seam, the development of an iron deposit through the building of blast furnaces, the building of a steel mill for the utilization of iron, the erection of a plant for the creation of energy—regardless of the nature of the development—he knew what he was about and made no doubtful answers when the men of money, whom he sought to interest, began to ply him with questions relative to the project.

A quiet, unassuming man, soft-spoken and undemonstrative, having about him not one element of the "high-pressure salesman" of whom so much is heard today, he carried conviction because of the unfailing knowledge he had obtained covering every essential fact connected with the project at hand. It has been said that facts are eloquent, and it was the sheer eloquence of the great mass of indisputable facts that he had gathered which enabled him so to impress investors that through his energies and the movements he put in motion, hundreds of mil-

lions of dollars were poured into the South in the development of its resources.

As a young man he found the South, the place of his birth, burdened with a colossal weight of poverty. In his maturity he saw it transformed into one of the richest portions of the earth, and may it be said without equivocation that he contributed more to this end than any among the pioneers—though he would be first to disclaim such credit; for no man ever was more modest or self-effacing.

The South had the natural wealth, buried in a thousand hills and sweeping along innumerable valleys, but it lacked one of the greatest of all transforming agencies—Power. And Captain Lay applied the power. One of the first, if not the first, man to conceive the idea of developing electric energy by water power and transmitting it to far places, he carried the vision along until it became a magnificent reality, and then the South began to move with quickened tread—a movement that still is in progress upon an increasing scale and which undoubtedly will make it the most populous and most prosperous section on the face of the earth.

When a man achieves such ends, without eagles upon his shoulders and without carrying a single youth into mortal combat, the fact is worthy of being placed in the record; not only because of the inspiration it may prove to the young and purposeful, but because such service is entitled to recognition and grateful appreciation.

CHAPTER II

THREE GENERATIONS

FOR more than a hundred years the name "Lay" has been inseparably associated with the Coosa-Alabama River three generations, in this family, having pioneered in their development.

John Lay, who fabricated a dwelling from the hearts of virgin trees and planted the family home upon the Coosa more than a century ago, turned his attention to this waterway at that time and for years carried on a flat-boat trade between the upper reaches of the Coosa and the City of Mobile, nearly eight hundred miles distant. His son, Cummins M. Lay, became a pioneer steamboat builder and navigator, and his grandson, William Patrick Lay, pioneered in the development of its power resources and the movement to open it to navigation all the way to the Gulf.

Typical of his thoroughness, and of the high purpose and courage of the pioneer, was the residence which John Lay built in the wilder-

ness. It is a strong, two-story structure that still stands staunch and sound after the blasts of more than a hundred winters. And typical, too, of the energy and thoroughness of the man is the character of materials used in building this home. Many pioneers were satisfied to build with hewn logs, but it was not so with John Lay.

Having selected the site for this house, a splendid elevation upon the West shore of the Coosa, in Cherokee County, Alabama, about twenty-five miles below Rome, Georgia, he planned a great, square-type structure, typical of the Colonial architecture of Virginia, from which State he came, and began the tedious work of evolving it from the wilderness. All about were splendid trees, and of these he selected the best. Then began the laborious task of producing lumber.

Neither the sash saw nor the circular saw had been introduced at that time, and the only means of cutting the logs into lumber was by use of the whip-saw. This was a long, narrow instrument with a handle at either end, and was manipulated by hand. The log was placed upon high wooden benches known as carpenter's horses,

and one man got beneath and another above, and the sawing began. Thus day after day and week after week the lumber slowly was produced and the house began to take form. Meanwhile nails were being produced—another task that involved hand labor—and brick were being made for the two great chimneys that were to stand at either end of the structure.

About two years were required to complete the home, but when it was finished it stood brave and firm upon the height, its back to the river and its face to the wilderness. This, too, was typical of the pioneer. He knew that the wilderness must be conquered and so he faced it, consciously or unconsciously, and labored to transform it.

There were no highways and no railroads, and since without transportation there is no transformation, John Lay turned to the river, concurrently with the construction of his home, and began the development of the flat-boat trade that was to play such an important part in the lives of the people.

Though the flat-boats were destined to destruction after making one trip to Mobile, in

building them John Lay displayed the same skill and attention to detail that marked the erection of his home, and it became proverbial all up and down the far reaches of the river that a Lay shipment would go through.

Steamboats were, of course, unknown at that time, Robert Fulton having yet to make his famous journey up the Hudson and introduce a new form of transportation, and even had steamers been available it would have been impossible for them to have navigated the length of the river because of the great rapids, where any hollow craft would have been in danger of being torn to pieces by the multitudinous rocks over which the swift waters boiled.

So the flat-boat furnished the only practical means of communication between the isolated upper reaches and the port city of Mobile, and, owing to the turbulent shoals, even this form of transportation was possible only during high water. These boats were built of hewn timbers and were provided with strong helms and several great oars to be manipulated by the slaves.

As a rule the flat-boats moved in a train, anywhere from three to a half dozen or more being

lashed together so that they might snake their way along through the many sudden and perilous shifts of current.

Pioneers for miles around knew when the boats were to leave, and produce of all kinds were brought in for shipment; cotton, grain, cattle, poultry and many other things being loaded for transportation to the Gulf and conversion into money or into articles that were needed by the pioneers as they struggled to overcome the wilderness.

The distance that was covered by these early boats in a month is covered now by train within less than one day, but what a difference in the sensation! To navigate those eight hundred miles of the ever-changing scenery was an experience never to be forgotten.

The demand for transportation was heaviest in the fall months, when crops had been harvested and vast quantities of materials, the rich bounty of a virgin soil, had to be floated to market. So the flat-boats started out—and what a journey! For the entire distance, except where clearings had been made for landings or settlements, and where occasional cliffs of limestone or marble overhung the stream, the jungle crept

close to the river's edge and overhung it—reaching long arms out over the purling waters. And in the fall when the forests had begun to turn, no avenue ever made ready for a triumphal procession was adorned with such beauty as adorned the Coosa. It was as though nature sensed the approach of the holiday season and proceeded to decorate the whole landscape with all the colors of the rainbow.

Mile upon mile, for hundreds of miles, the rich and shining colors leaped from the water's edge to the very crest of the towering hills, blazing with such tints as no sunset ever produced. Now and then fawns would be seen to step daintily to the brink to slake their thirst, or perhaps there would be a splash far ahead, and a giant buck would be seen plunging across the river, his antlers bobbing as he pushed toward the far shore. Or there might be a crashing in the wilderness, as a bear bore down upon the stream, or a great fluttering overhead as thousands of wild ducks swept South.

People of today have but the slightest conception of the extent of wild life prevailing at that time. Pigeons, during periods of migration, were so numerous that the sky literally was

darkened at times and so great was the weight that when the birds alighted for rest, trees actually were stripped of limbs by the weight of the mass. The Encyclopædia Britannica, in commenting on this subject, quotes a Kentucky observer who estimated that one company of migrating pigeons consisted of not less than two billion, two hundred and thirty million birds.

Other birds and animals were plentiful and clever shots aboard the flat-boats had no difficulty in obtaining an abundance of game and the larder was provided with the best that nature afforded.

Provision was made for cooking by laying a deep floor of earth upon one or more of the boats and here fires were built and the foods were prepared and feasts were enjoyed.

Rude shelters were also provided against rain and storm, but at best the experience entailed many hardships, imposing labors of the most strenuous nature as the rapids were being run.

Travel was chiefly by day, but when the moon was shining full and the helmsmen knew the river, it was not unusual for the trip to continue a few hours into the night. But when nights were dark and currents dangerous, as always

they were in the rapids, the boats would be tied up to the bank, or to one of the many islands, and all hands would rest until the first peep of dawn, when off they were again.

So the long journey would progress, while men dozed or sang or played during the periods when the calm stretches were being covered. Then would come the rapids, and it was every man to his post—white and black, bond and free. All eyes were on the boiling waters ahead, watching for the high-flung spray that marked the presence of rocks that would tear the boats to pieces if given a chance. On and on, mile after mile, men pulling at the great oars and the heavy tiller, crying commands, sweating, toiling, straining, watching, and finally the safe passage into waters that were deep and calm and restful.

On through the wilderness they went, with no evidence anywhere of the touch of man's hand, save at the few and scattered settlements; everywhere things about as they were when first De Soto beheld the Coosa River and feasted his eyes upon its virgin beauty.

Along the way, too, were many islands, wild spots where men came to engage in the manu-

Ancient water mill, typical of hundreds of primitive power plants that have fallen into decay throughout the South, bearing witness to the changes wrought by hydro-electricity.

One of many "moonshine" stills that operated upon isolated islands along the Coosa before the coming of the power age. The lake formed by Lay Dam submerged this still along with many others.

facture of illicit liquors in later years, carrying on the pursuit until the islands were covered by the back waters of the giant dams that finally began to span the stream—but that was nearly a century ahead. * No such thought occurred to anyone upon the river in those far days. Rather the thought was to dodge those islands, to keep to the current, to forge on to the river's end! For far up the river men were waiting for the return upon cotton and grain and cattle, and praying that wits might be keen and muscles strong and providence kind, to the end that the market might be reached and the goods converted into the money or materials so sorely needed in meeting the problems of transforming the wilderness into fruitful fields.

On they went, those bold forerunners of the transportation giants of today, until finally they came to the point where the red waters from the Tallapoosa were encountered and the two streams merged to form the Alabama River. Swifter, deeper, the current runs now, and presently they are passing the high curved embankment upon which is forming a settlement

* On opposite page is shown a view of one of the many "moonshine" stills that flourished on the Coosa River in the old days.

one day to become the Cradle of the Confederacy—the first capital of a new nation whose passing after four years was to witness the freedom of the blacks, perched upon the cotton, crooning their songs as the boats drifted along in the wide, deep waters.

Further along another little settlement is coming into being, a settlement that was to produce John T. Morgan, who was one day to stand in the United States Senate and dedicate himself to the great task of providing a waterway between the Atlantic and Pacific oceans. And so on until at last the river widens into a bay and shortly the rafts are brought up at Mobile, a city so newly American, so recently Spanish; a city where bold and adventurous spirits came from the seven seas, and had come these many years; a city from whence flowed all the commerce of a wide territory to all the ports of the world.

The journey ended, there was the matter of disposing of the merchandise, and the flat-boats which had brought it those hundreds of miles; the executions of various commissions for the isolated folk far back along those hundreds of miles of water. These things done, there was the

matter of getting home, of covering those hundreds of miles on horses or mules or afoot—struggling through vast stretches of almost virgin forest, along roads that often were mere trails, and so at last to the point of beginning, there to make ready for another trip.

Thus the era of transportation by flat-boats came and challenged the energies of John Lay. But a new age was dawning, and it arrived about the time that Cummins M. Lay, a stalwart son of John Lay, was reaching maturity. It was the age of steam, and Cummins M. Lay threw himself behind this new development as his father had behind transportation through the medium of flat-boats. He had come to know the Coosa as a man knows the palm of his own hand, and became the first and only man ever to pilot a steamer for the full length of the river, through the still waters as well as the turgid stretches where great sharp-toothed rocks reached out at every turn in vain effort to rip holes in the wooden bottom.

This amazing feat was attempted at the request of the Confederate government, which not only needed the craft but was anxious to prevent it falling into the hands of the Union

forces which then were investing Rome, Georgia, being encamped just across the Coosa from that city.

There were two steamers at Rome which Captain Lay undertook to save, the Laura Moore and the Alpheretta. Proceeding with the utmost caution, he caused barricades to be erected about the pilot houses and boiler rooms, using bales of cotton for this purpose.

These precautions taken, the adventure was under way. Taking charge of the Alpheretta and placing the Laura Moore in charge of a skilled pilot, with instructions to follow, Captain Lay set forth, proceeding as quietly as possible.

But experience proved that to steal away with two steamers, whose stacks belched great clouds of smoke and fire, was not to be accomplished without difficulty. The exploit was quickly observed by watchful gunners and shortly cannons began to boom and water to cascade about the steamers where the solid shot fell. Some shots went true, but they struck the bales of cotton and did no serious damage. So presently the ships were out of range and the first stage of the perilous journey was over.

The steamers were pushed on to Greensport, which was as far as they could be carried at the shallow stage of the river. There they tied up and were held, pending the coming of high water, Captain nor crew knowing at what hour the enemy might come in pursuit.

Presently rains came and the waters arose to a height sufficient for boats to shoot the rapids and the journey was continued to an island near Wilsonville, where the vessels were tied up pending the arrival of the maximum crest. The point became known as Steamboat Island at that time and since has borne this name.

When the river finally attained the maximum height, Captain Lay took the Laura Moore and launched upon the desperate exploit, depending solely upon his knowledge of the treacherous course to save the vessel from the submerged rocks over which the seething waters raced. Never leaving the wheel a moment during the hair-raising dash of more than a hundred miles, featured by a hundred narrow escapes, he finally brought the vessel through and in due course it steamed up to the dock in Mobile—the first and only steamer ever to make the journey

through the rapids. No other has dared attempt it, even to this day.

Having delivered the steamer to the Confederate government, Captain Lay was commissioned to handle shipments of pig iron from Cornwall furnace, near his home in Cherokee County, to Selma, where the Confederates were manufacturing cannon and ammunition. Returning to Cedar Bluff, near his home and near the Cornwall furnace, Captain Lay built some flat-boats and began carrying iron to a point near Wilsonville where the Alabama and Tennessee Rivers Railroad had been carried across the river. The iron then was transferred to cars and carried to Selma.

While this work was in progress, the Union army had gained possession of a large part of the country on the West side of the Coosa River in the vicinity of Cedar Bluff, while the Confederates were in possession of the East shore. One day while loading two flat-boats with iron, Captain Lay was startled to see about two hundred Union soldiers upon the East side of the river, across from where he was at work. The soldiers had him and his helpers covered with their weapons, and the commanding officer,

who happened to be Colonel Godfrey, ordered him to come across with one of the boats and to make a quick job of it. Taking the second boat, which was practically empty, Captain Lay crossed the river and found the soldiers in great excitement. They had been on a raid on the Confederate side and evidently were expecting pursuit by a much larger force.

Colonel Godfrey ordered Captain Lay to transport his men across as speedily as possible and expressed doubt when the latter said he could get the whole force over in two hours. This he did, and when the job was done Colonel Godfrey asked him what he was doing with the iron and the upshot of it was that he ordered holes cut in the boats and they sank to the bottom—where they rest until now, so far as is known. This done, Colonel Godfrey said to Captain Lay:

"You realize, of course, that you are under arrest, but you have rendered a valuable service and may go free." He then departed and, gathering up a few possessions, Captain Lay turned his back upon the flat-boat trade and made his way to his home. On reaching this fine old place, he found that the soldiers had been there, but Colo-

nel Godfrey had placed a guard over it on learning whose home it was, and no harm came to it, or to any of the Lay possessions.

The Alpheretta, which Captain Lay left at Steamboat Island when sailing down the rapids with the Laura Moore, was still there when the war ended and Captain Lay worked it back over the rapids during a period of high water and sailed it for many years upon the navigable portion of the upper reaches.

CHAPTER III

A THREE-FOLD VISION

ABOUT eleven years prior to the exploit of the Laura Moore in running the rapids of the Coosa, an event that was to have enormous significance to the future of this stream, had taken place in the home that had been erected in Cherokee by John Lay. This event was the birth of a son to Mr. and Mrs. Cummins M. Lay. This son, born in 1853, was named William Patrick Lay. That he, too, should have been won by the Coosa, as his father and grandfather had been, was not surprising, but that he should have accomplished through that stream such ends as would literally transform his State, not even the most imaginative could have foreseen.

Father and son had utilized the Coosa as they found it. William Patrick Lay, as he reached manhood, conceived the idea of transforming it, and this vision was followed through the vicissitudes of nearly a half century until the river became a mighty instrument of service. In a

word, he brought about a condition under which the Coosa River is becoming the most highly developed waterway in the world and the first to be developed upon the three-fold principle of power, navigation and flood control; a conception that, for the first time in history, was put into practice when the Coosa River developments of today were begun.

As the years unfolded, William Patrick Lay came to see in the Coosa not only a great artery of commerce, developing the richest sections of Georgia and Alabama, but a source of enormous power, to be utilized in turning the wheels of industry over vast areas, to the lighting of great cities and lending speed to the progress of the South. He saw in it a medium for bringing to the South agencies for fabricating the raw materials into finished products suitable for mankind throughout the world, and also the means for carrying these products to the sea at a minimum of cost.

But this vision, so vast in its scope, was not born in a day nor were the initial steps accomplished without many years of tireless labor in the face of appalling disappointments and temporary failures.

At the time William Patrick Lay reached maturity and began to interest himself in the developments that were so dear to his heart, the Coosa-Alabama Rivers were navigable upon the upper reaches, between Rome, Georgia, and Greensport, Alabama, and the lower reaches between Wetumpka and Mobile. But between these two navigable sections were 142 miles, broken by rapids that were impassable except to flat-boats going down the river during high water.

Largely through the efforts of Captain Lay the United States Government was induced to begin work on the Coosa with the view to opening the stream to navigation for its entire length. Work got under way about 1885 and continued for five years, when the Government abandoned the project. The work had proceeded along the primitive lines to which the Government then was wedded and which was contrary to the principle of co-ordinated development for which Captain William Patrick Lay fought for many years and ultimately put into practice.

While this decision on the part of the Government to stop the development was most disappointing to many at the time, the maturity of the plans of Captain Lay created conditions under

which the abandonment appeared in the light of a gracious act of Providence, for had the many low-lift dams been built as first planned by the government, the usefulness of the river for power purposes would virtually have been destroyed and the hundreds of thousands of horse power subsequently developed might never have materialized.

It was while this governmental work was in progress that Captain Lay had his magnificent conception of creating electricity by the utilization of water power and transmitting it to distant points.

Between the years of 1884 and 1889 when the government was engaged in building Locks One, Two, Three and Four, below Gadsden, Alabama, it entered into a contract with J. H. L. Wood, who owned properties at Lock Two, to build a flume for Mr. Wood in consideration of certain valuable rights and easements, the flume being intended to provide power for turning a water wheel, which in turn was to operate a mill and wool carding factory.

This flume was built and it was while watching the water pour through it that Captain Lay conceived the vaulting thought that water might

be caused to turn a dynamo and generate electricity at the riverside and that the current then might be conveyed to distant points. He conceived this great vision in 1887, before long-distance transmission was even a possibility, but years later he saw it fulfilled in the most graphic manner. But between the vision and the hour of fulfillment were many years of toil and sacrifice such as few men would have been able to survive.

To comprehend even to a limited extent what the vision led to, one would have to see the magnificent plant at Lock 12, on the Coosa River, near Clanton, Alabama, which only recently (November 23, 1929) was formally christened the "Lay Dam" in recognition of the priceless services of the man who in 1887 stood beside the little flume on the Coosa River and saw visions and dreamed dreams.

At that time, 1887, Captain Lay was building the first electric plant ever erected in Gadsen, Alabama, his home city. It was operated by steam, of course, the thought of hydro-electricity not having been conceived until the moment, and the art of long-distance transmission not yet having been developed.

Early electric plants produced what is known as direct or continuous current, and electricity in this form could be conveyed for only short distances, but even then the alternating current was the subject of experimentation and its commercial development by Westinghouse, soon thereafter, was to solve the problem of transmission over many miles without appreciable loss.

The coming of the alternating current made possible the realization of the vision of Captain Lay—the generation of electricity by water power at the river and the transmission of the current to far places.

In 1903, Captain Lay built a small hydro-electric plant on Big Will's Creek, near Attalla, Alabama, and this plant, though small, proved a splendid success. It vindicated a theory which he had long entertained and which he now hoped to apply upon an immensely larger scale.

For years prior to this, Captain Lay had been giving much thought to the development of energy on the Coosa River, the same to be co-ordinated with navigation and storage reservoirs for the amelioration of floods.

This great thought of co-ordination had impressed him so profoundly that he sought to

impress it upon others, with such success that it was finally adopted in the Coosa River development and also on other streams throughout the country.

In 1890, Captain Lay caused the Coosa-Alabama Improvement Association to be organized and he was elected president, a position which he has held since that time, this continuous recognition bearing witness to his sustained zeal in carrying forward the work.

The survey of the Coosa River under which the development first was started in 1872 called for many low-lift dams and in order to provide for the utilization of the power resources it was essential that a new survey be made.

Captain Lay began in 1902 a vigorous campaign to bring about a new survey and was successful after three years of labor. As this survey was being made by United States engineers Captain Lay tried diligently to emphasize his views upon the theory of co-ordinated development—navigation, power and the amelioration of flood conditions through the building of high dams and the creation of storage reservoirs—but the results were disappointing. The new survey fell short of the vision—was too tightly bound by

tradition to meet the new era that was dawning and which shortly was to revolutionize engineering thought upon the subject of waterway developments.

The crux of the new scheme of development was the high dam—seventy, eighty, a hundred or more feet, backing up the water for many miles and making the erection of dozens of low lift dams unnecessary, while at the same time, providing an abundance of water for navigation and for power, but the engineers then could not or did not have sufficient imagination to visualize the possibility. The high dam was too experimental!

High dams had been built for other purposes than the development of power and the promotion of navigation, but the results had not been of a nature to inspire great confidence. Recollections of the Johnstown disaster still were fresh in the public mind, and doubly fresh in the engineering mind, and many similar disasters in the world's history held forth their warnings. So the ruling against the high dams on the Coosa was prompt and decisive.

This rebuff convinced Captain Lay of the

Primitive lock on Coosa River where Captain Lay, in 1887, conceived the thought of hydro-electricity and long-distance transmission, the water pouring through the mill flume at the left, suggesting the idea.

futility of attempting at that time to bring about co-ordinated development through the aid of the government and he started forth upon the long journey to bring it about through the enlistment of private capital. To this end he organized the Alabama Power Company and put the movement upon a corporate rather than an individual basis. His next step, as detailed more fully in subsequent chapters, was to obtain a permit from the government for the erection of a dam at Lock 12—Lay Dam—and then to seek money with which to build. It was in 1906–7 that he organized the power company and obtained the governmental permit, getting the latter by shrewdly concealing the fact that he contemplated erecting a high dam until Congress had passed the act, which provided for a dam "of such height" as the Chief of Engineers and the Secretary of War might approve.

Meanwhile, still determined ultimately to bring about the Coosa development upon the co-ordinate basis, and recognizing the necessity of converting the government to the theory, Captain Lay had started a movement for a third survey of the river, and finally, in 1910, he suc-

ceeded in this undertaking. Another survey was ordered and Colonel H. B. Ferguson was placed in charge.

This, the third survey upon the Coosa, became unique because it comprehended fully, for the first time in the history of the world, a completely developed river, anticipating all the aspects of navigation, power development, flood control, storage reservoirs, and so forth.

Colonel Ferguson readily concurred in the plan that Captain Lay previously had advocated, realizing that such a plan would not only save the government immense sums in the improvement of the river for purposes of navigation, but add greatly to the general wealth by creating sources of energy.

The old system had been to build low-lift dams and many of them (31 being specified on the Coosa), with no thought of anything except navigation, and with the government supplying the money required for the job.

The new system, which the Ferguson report embraced, called for high dams, through which great numbers of low-lift dams were eliminated, and the cost of improvement, in so far as the government is concerned, greatly reduced, ow-

ing to the erection of these high dams by private capital in the development of water power. Colonel Ferguson saw that it not only meant greatly improved navigation, because of the greater depth created by the large bodies of water that would be piled up behind the high dams, but that it meant quicker navigation, since much time would be saved by reason of the fact that vessels would not have to be carried through nearly so many locks in navigating the river.

The Ferguson survey also visioned the great value of vast storage reservoirs, where the waters might accumulate in times of plenty for use in times of drought. Thus the whole conception of Captain Lay passed into the Ferguson survey, which not only became a great engineering achievement, but a historic document of exceptional value because it was the first time that all these phases of river development were recognized as being related; the first completed picture of a magnificent conception, new then but now universally recognized as embodying the true ideal in the development of water resource.

How the co-ordinated plan of development operates was aptly illustrated in the erection, in

1913, of the great dam at Lock 12—the Lay Dam—which backed the water up for twenty-five miles over the worst part of the whole rapids and eliminated seven of the low dams that were provided in the original United States survey. Thus was accomplished with private capital, what it would have cost the government at least $5,000,000 to $6,000,000 to achieve by means of low-lift dams. The government saved money, navigation was fostered and power was developed. In brief here was a concrete example of the Lay principle of co-ordination.

But this is getting far ahead of the story, for the Lay Dam was as nebulous as a wisp of fog for many years after Captain Lay received in 1887 the inspiration looking to hydro-electric power combined with long-distance transmission.

To make that dream an actuality was even more difficult than persuading a reluctant government to make repeated river surveys!

Following the practical development of the alternating current, some two years after he had conceived the idea of hydro-electrical generation, Captain Lay began maturing his plans for

the development of power on the Coosa River, both as a means of providing additional energy for the State and surrounding territory, and as an aid to the government in the promotion of navigation.

In pursuit of the idea, he tramped up and down the river, from the headwaters in the Appalachians far above Rome, Georgia, all the way to the confluence of the Tallapoosa. Not only so, but he familiarized himself with the headwaters of the Tallapoosa, discovering suitable sites for great reservoirs at the headwaters of both systems. He also discovered suitable sites for power dams and gradually obtained property rights and easements looking to the erection of such dams.

Years went into labors of this nature and in 1906 he felt that the hour had come for the quest of the greater vision—and he struck out boldly by organizing the Alabama Power Company, personally advancing the original capital stock of $5,000. He was on the way to glittering success but little dreamed of the colossal difficulties that would have to be surmounted; of the treacherous shoals and dangerous currents that lay ahead, calling for the genius and hardihood

that is born of worthy tradition and backed by generations of resourcefulness. He was to need the courage he had inherited from generations of pioneers!

CHAPTER IV

LAYING THE FOUNDATIONS

THE conception in the minds of many people—so carefully propagated by the demagogue—that great enterprises engaged in converting raw materials into things of utility, are born quickly and are based upon the desire to accumulate easy money at the expense of the people, is so far from the truth that it may be well to recite somewhat in detail just how such enterprises actually come into being. The story of the Alabama Power Company, one of the present-day giants of the hydro-electric industry, is typical of the genesis and experience of many enterprises that ultimately attained greatness, and therefore may serve to illumine the subject and to correct popular conceptions.

In the first place it may be observed that big money is never out for "easy money." Men with the capacity and training necessary to accumulate large means know that there is no greater fallacy than "easy money" and they look upon

any "easy money" proposition, not as something calculated rapidly to increase their wealth, but as a thing fully capable of separating them from such wealth as they possess. As a matter of fact, their thought primarily is not upon the size of the return, it is upon the safety of the investment. If this can be assured, then they are satisfied with a very small return.

Instead of being ever ready to rush out and seek to gobble up everything in sight, big money is forever lurking in its fortress, fearful that it may be gobbled up if it ventures into untried fields. Therefore, the man who seeks to enlist capital for an untried enterprise has launched himself upon a mission that is beset with almost insurmountable difficulties and if he succeds, as few do, he has performed a feat that approaches the miraculous.

In view of the light it throws upon the multitudinous difficulties that are encountered when one enters upon such a mission, it may be of interest to trace the experience of Captain Lay in developing the power movement in Alabama to the point of production. Many appear to think that there was a giant "octopus" full grown and eager to spring into this field, which is so

far from the truth that it becomes ridiculous.

It took many years to enlist capital for the initial development and when finally it was enlisted it came from England and Canada, it having been impossible for Captain Lay to obtain money in the United States for developments of this character.

The view that water-power development was experimental and therefore questionable from an investment viewpoint, was, of course, justified by the then existing facts. There was no precedent upon which to go, therefore no certainty that the return would justify the outlay.

Not only was there uncertainty about the ultimate returns, but there was the certainty that no return whatsoever could be expected for a long time. Unlike many enterprises, a hydro-electric plant may not be built piecemeal. It must be built to meet the maximum expectations. A plant such as the first built in Alabama, at Lock 12 on the Coosa, represents an investment of approximately $25,000,000. This means that an enormous sum must be put out with the certainty that there will be no return during the course of erection. Then there is the additional certainty that the return will be small for

several years following erection, since allowance must be made for the reluctance of consumers to change from privately owned steam plants to hydro-electricity. Moreover, a surplus of power must be provided to care for new enterprises that are to come into being from time to time in the field which it is intended to serve.

Under the circumstances it is not astonishing that capital was impossible of attainment in the United States for the initial plant of the Alabama Power Company, but astonishing that it was obtainable at all anywhere.

Before proceeding with the effort to enlist private capital in the development of power on the stream, Captain Lay conceived it to be his duty to acquaint his associates in the Coosa-Alabama Improvement Association with his purpose and to enlist their co-operation if possible.

In this connection it is to be recalled that the Government had abandoned the construction of low-lift dams on the river and had not been converted to the theory that the high dam was practical in the promotion of navigation. Therefore, developments were at a standstill.

Up against this situation, Captain Lay called a conference of those who had labored with him for the opening of the Coosa River to navigation, and laid the matter before them. For this meeting the use of the United States Ship Leota, then on the Coosa at Gadsen, Alabama, was obtained, and the conference was held thereon early in 1905. Among others who attended and who had labored earnestly in behalf of the project was Congressman John L. Burnett, of the Seventh Alabama District, who died several years ago.

Captain Lay called the meeting to order and briefly recited the failure attending the effort to obtain governmental action, and he suggested that an effort be made to enlist private capital in the building of high dams for power purposes, thus facilitating the work of opening the river to navigation.

This suggestion was approved unanimously, but not one volunteered to furnish any of the "private capital" that was essential to going forward with the work! However, they urged Captain Lay to push the project and see what could be accomplished, pledging their moral support. When the boat docked and the crowd dispersed the job was entirely in his hands! If

power was to be developed and navigation fostered, it was up to Captain Lay to bring it about.

Realizing that information was essential to success, Captain Lay first undertook to obtain maps and data produced during the Cavanaugh survey of the Coosa, but he found that these records were regarded as secret and access to them was not permitted. He made repeated trips to Washington and finally the late Senator J. H. Bankhead, of Alabama, took the matter in hand and arranged a meeting of the Rivers and Harbors Committee, of which he was a member. Senator Bankhead insisted before the committee that the information should be made available to Captain Lay, as President of the Coosa-Alabama River Improvement Association. The committee passed a resolution calling upon the War Department to furnish the information and this was done.

In the light of these data and the personal knowledge he had of the various factors, Captain Lay determined to proceed with the Lock 12 proposition, and realizing that it might facilitate matters to have a corporation behind the movement, rather than a single individual, he

organized the Alabama Power Company. This company was formed in Gadsen, Ala., on December 4, 1906, with a capital stock of $5,000, all of which was advanced by Captain Lay.

Three persons being necessary to the formation of a corporation, Captain Lay brought in his son, Earl Lay, and his attorney, O. R. Hood. One share of stock was transferred to Earl Lay and another to O. R. Hood in order to qualify them as officers and directors, and the necessary papers of incorporation were prepared and filed on that date. Captain Lay was elected President of the company and his son, Earl Lay, Secretary.

On that cold December day in 1906, when this little organization was formed with a colossal work in view and with pitifully inadequate means at hand with which to carry on, it is doubtful if there were a half dozen persons who believed anything would come of it. Those familiar with the subject knew that it would require many millions of dollars to accomplish the task, and knew also that the economic phases were so nebulous that the enlistment of capital would be practically impossible.

In the first place, no one knew what it would cost to generate and deliver power by means of

hydro-electric plants. It might be less than it could be delivered for from a privately owned steam plant in a factory establishment, and it might be more; it might be less than municipal plants were paying to generate power, and it might be more—no man knew and there was no adequate store of authentic information that might throw conclusive light upon the subject. In brief, the situation was one in which millions of dollars would be required and no basis upon which a return could be calculated with certainty.

Complicating the situation, was the fact that Alabama is a coal state, possessing abundant and cheap fuel for the generation of steam. Therefore, competitive conditions that would have to be met by any new source of energy would call for exceptionally low figures.

Again, there was the element of habit, of tradition, that would have to be weighed. The industrial establishments that had installed modern steam plants at great cost would be slow to abandon these plants, and certainly would not do it unless the hydro-electric energy proved more economical and more efficient.

The same rule would apply, of course, to

steam plants engaged in furnishing electricity to light communities and to operate street railway systems. Such plants involved large investments and undoubtedly there would be considerable hesitancy about shutting them down and purchasing the necessary current from a concern operating at some distant point upon a river. Certainly they would not do it unless shown a very material saving in operating cost, and unless thoroughly convinced of the permanency and adequacy of the supply.

These thoughts convey some idea of the difficulties in the way, and Captain Lay began diligent efforts to obtain light upon the relative cost of steam and electric power. Data of this nature proving unavailable, he undertook to create conditions under which some concrete knowledge might be obtained.

At that time there was a large grist and flour mill in Gadsden that had recently installed one of the most modern steam plants—the Cassells Mill—and Captain Lay undertook to interest Mr. Cassells in the subject of electric energy as a substitute for steam. Years before, in 1888, when Mr. Cassells was operating a tiny mill in the back of a general merchandise store and

Captain Lay was operating the original electric plant in Gadsden, Mr. Cassells had been induced to adopt an electric motor for the operation of a corn crusher, and it had given satisfaction. So, with this early experience as a background, Captain Lay approached the subject of operating the modern mill electrically. But it was a cold trial. Mr. Cassells knew that he had the best steam plant available and that it was costing what he felt was the minimum, and he could not be moved.

However, when the matter was put to him as an experimental proposition, with a view to establishing definite records of the difference between steam and electricity, and it was agreed that the experiment was to cost his organization nothing in excess of steam power, he agreed for a motor to be connected with his main shaft and to cut out the steam plant for the time being.

Captain Lay, who long since had sold the local electric plant to others, went to one of the owners, Mr. E. T. Schuler, and induced him to install the motor necessary to drive the Cassells Mill. This was done and a rate of two cents per kilowatt hour was given the plant, a figure that now may be compared to the present-day in-

Section of rapids on the Coosa River. At one point 300 of these islands were found within a distance of four miles. All were submerged by the erection of Lay Dam at Lock 12.

dustrial power rates that are figured in mills instead of in cents.

Though the electricity supplied the Cassells Mill was generated by steam and though the rate was two cents, it saved the mill $87.00 per month over the modern steam plant, and that settled the fate of the steam plant.

Meanwhile, Captain Lay was pushing inquiries in many other directions. He visited ore mines, manufacturing plants and similar enterprises all over the State and sought through every possible avenue additional light on the matter of relative cost between the two systems of energy—steam and water power.

The primary issue between the steam and the hydro-electric plant is investment cost versus fuel cost. The hydro-electric plant involves an enormous investment, but there is no fuel cost; the steam plant involves a much smaller investment, but there is the perpetual item of fuel cost. Thus the issue narrows down to one of economy, and Captain Lay was positive that upon this basis water power could and would survive in the great majority of instances. But believing a thing and being able to prove it are quite different, and he knew that proof would

be required before capital would be available. Thus he lost no opportunity to gain light on the subject and began to accumulate an array of facts and figures which, after years of running up and down the country, consulting hundreds of men of money, finally carried conviction.

CHAPTER V

ONE ON THE GOVERNMENT

HAVING formally organized the Alabama Power Company and put in motion his fact-finding movement, Captain Lay turned to the problem of obtaining governmental permission for the erection of a dam at Lock 12 on the Coosa, and this, too, was a problem that presented immense difficulties.

It is to be recalled that the government engineers up to this time—1906—had positively turned thumbs down upon high dams. The Ferguson survey under which this type of construction was approved was still a thing of the future. As matters stood the high dam was strictly taboo, yet it was the very heart of the proposed development. Without it the whole project necessarily would fail, since the sum of power possible to develop through a low dam is of little consequence.

How to get the government to sanction the high dam, therefore, became the most essential

problem, and it caused many an anxious hour, but in the end it was solved by an act as ingenious as any ever laid before the Congress of the United States.

This Act (Public No. 247) was drawn by Captain Lay himself and the opening paragraphs read:

"An act permitting the erection of a dam across Coosa River, Alabama, at the place selected for Lock No. 12 on said river.

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress Assembled, That the consent of Congress is hereby granted to the Alabama Power Company, a corporation organized under the laws of the State of Alabama, its successors and assigns, to build a dam of such height as the Chief of Engineers and the Secretary of War may approve, across the Coosa River in Alabama, at the place selected for Lock and Dam Number Twelve on said river, as located in the survey made by the Engineers of the United States of the Coosa and Alabama Rivers in Georgia and Alabama, in compliance with the requirements of the River and Harbor Act, approved June 13, 1902, for the development of water power, and such works and structures in connection there-

with as may be necessary or convenient in the development of said power and in the utilization of the power thereby developed."

There followed various technical provisions, but the crux of the proposition was contained in the above paragraph and in the words "of such height." Had the height actually been mentioned there is no doubt that some Congressman or Senator immediately would have been on his feet with a feeling speech recalling the Johnstown disaster and emphasizing the government's proverbial attitude of conservatism in dam construction, and the fat would have been in the fire. On the other hand, there was nothing alarming in the "of such height" provision, and the measure finally was passed. Yet it took a hard, patient drive to put it through, Captain Lay having to spend months in Washington nursing the movement along. Finally though, thirty minutes before the adjournment of the Congress of 1906–7, the act was passed and was approved by President Roosevelt on March 4, 1907.

A tremendously important step was thus achieved, but there remained another great hurdle that would have to be passed, and this was

the negative nature of the engineer's report upon the Coosa, as this report related to the high-dam project. However, Captain Lay now was at the fountain head of authority, the Chief of Engineers and the Secretary of War, and so positive was he of the soundness of his proposal and so eloquent were the facts that he was enabled to present, that a permit finally was granted authorizing a dam at Lock 12, seventy-five feet in height. The argument which finally won was this:

"If the dam is experimental, private capital is supplying the money for the experiment, and even though the dam does wash out, it will be nothing out of the pocket of the government."

To understand how revolutionary a seventy-five foot dam was in connection with governmental operations in the promotion of navigation, one has only to recall the nature of the development upon the Ohio River, the canalization of which finally was brought to completion in 1929 after the expenditure of colossal sums and many years of labor. There is but one high dam upon the whole vast development, this being located at Louisville and being in the

nature of an afterthought based upon the knowledge that has come in recent years and which was not available when the work first started. There are some fifty low dams, with as many locks, and no provision whatever for power or for flood control in connection therewith.

Had the Ohio River been developed along the lines of co-ordination, as advocated by Captain Lay upon the Coosa, the fifty low-lift dams could have been reduced perhaps seventy-five percent, a great deal of time would have been saved in passing vessels through locks, and hundreds of thousands of horse power would have been developed, aside from the influence that great storage reservoirs might have been made to exercise upon flood conditions. But co-ordination had not been thought of when the Ohio development got under way. The plans were, of course, made many years ago and were along the primitive lines to which the government was wedded.

In view of this circumstance, it is not remarkable that there should have been a pronounced disinclination to lend approval to a thing so revolutionary as a seventy-five foot dam upon a stream over which the government exercised the

right of development for purposes of navigation. Governments that survive achieve long life through conservatism, and the governmental mind naturally leans in this direction. Precedent is the only true guide to the present, and few officials care to risk their reputations upon experiments that may cost the people money or cause embarrassment to themselves.

But, in connection with the controversy over the high dam in its relation to navigation, it is interesting to recall that the Panama Canal was at this time, 1907, beginning to occupy a large place in the minds of governmental authorities and, as a matter of course, government engineers recognized that lockages much higher than those used on ordinary streams would be required to handle the ocean vessels that would be conveyed across the Isthmus of Panama, unless an enormously expensive sea-level canal were provided. Therefore, it is well within the bounds of probability that this had some relation to the final granting of permission to erect a seventy-five foot dam across the Coosa. The engineers doubtless felt that the erection of such a dam might provide data of value in calculating the requirements of the Panama Canal.

Lay Dam at Lock 12 on Coosa River, the first built on the principle of co-ordination, embracing navigation, the generation of power and the storage of flood waters. (100,000 horsepower.)

At any rate, the first permit the government ever granted for such a dam—and the last that was ever granted under such circumstances—was obtained by Captain Lay. Between its issuance and the final passage of the general water-power act, twelve years later, a state of total paralysis obtained. The great fight of the self-styled "conservationists" came on, as is chronicled in succeeding chapters, and water-power developments upon navigable streams stood still.

Having obtained the permit to erect the dam at Lock 12, Captain Lay had nothing to do now but get the money and build the dam, with its giant generators and its far-flung distribution system! In attempting to obtain this money, Captain Lay started out with a declaration of choice as to where he might obtain it, this choice being expressed as follows:

"First—In Alabama.
"Second—In the South.
"Third—In the United States.
"Fourth—Anywhere, O Lord!"

This order was adopted by Captain Lay because he had a deep and abiding faith in the theory that the development of hydro-electric

energy ultimately would greatly enrich those who pioneered in the work, and he wished these riches to be shared by the people of his native state; then, if not by them, by the people of the South, and, if not by them, by the people of the United States.

Following out this order of procedure, Captain Lay made diligent efforts to enlist capital in Alabama. He tried to make a contract with the City of Birmingham, the leading industrial community of the State, to furnish the city with power, but the proposal was turned down by the governing authorities because the plant had not been built and the money with which to build it was not in sight. Captain Lay urged that such a contract would enable him to get the money, but the officials would not see it.

Many capitalists over the State were interviewed and at one time it appeared that he was about to succeed at Mobile, but this deal fell through, as so many were fated to do before the quest for capital was ended.

Efforts were made to interest the street railway and power companies of Birmingham, New Orleans and other places, but all such attempts

met with failure and the field of search was broadened. Bankers and brokers and industrial organizations in the great money centers of the North and East were approached and months were spent in presenting data and negotiating propositions of one kind and another. Every now and then some group would display a lively interest; the subject would be gone into for weeks at a time, and it would appear that success finally was to be won, then one or the other of the groups would decide not to come in and the whole structure would fall. The quest would have to start all over again.

At various times negotiations were pending with the National City Bank of New York through their engineers, Sanderson & Porter; with the United States Mortgage & Trust Company; with Andrew Carnegie; with the Carnegie Trust Company; with the United States Steel Corporation; with Anthony N. Brady; with A. B. Leach & Company, and with Sutro Brothers, bankers, all of New York; with Stone & Webster of Boston; Bowman & Company of St. Louis; the Duke interests of North Carolina; the Dravo Construction Company of Pittsburgh;

J. G. White & Company of New York, and the Empire Engineering Corporation of New York.

Two financial institutions of Montreal, whose identities Captain Lay does not now recall, were also negotiated with, as were a number of others scattered over the continent. At one time the Dutch Bank of Berlin practically agreed to take over the project and sent one of its directors and engineers to Alabama to conduct the preliminaries, but because of adverse financial development in Germany at that time, this deal was postponed indefinitely.

The difficulty of obtaining the capital to go through with the enterprise is clearly apparent when the formidable list of bankers and financiers negotiated with is shown. "The fact is," said Captain Lay in discussing the subject, "so many times we thought we were right in the act of getting the necessary money when it would all go up in smoke that we began to think, as did the mule that had been beaten over the head with a stick—we were always expecting something to happen."

In the very last days before capital finally was obtained, Captain Lay and his associates

had the project under option to A. B. Leach & Company of New York, and the negotiations had reached such a point that they felt reasonably certain of the deal being consummated. Pending this, however, through one of Captain Lay's personal leads, Paul T. Brady of New York City, he had succeeded in getting in touch with James Mitchell, of the banking house of Sperling & Company of London, and his associates in Montreal. Negotiations were pending with these people who, in the event of the failure of A. B. Leach & Company to exercise their option, were expected to come to the rescue of the proposition.

The possibility that had been feared, that the A. B. Leach & Company deal would go "up in smoke" as so many others had done, became a fact, due to some of the subscribers to the proposed underwriting concluding to drop out. This was on February 1, 1912. Two days later, on February 3, 1912, in a New York hotel Captain Lay and his associates and James Mitchell signed an option agreement under the terms of which Mr. Mitchell or his assigns were given the right to purchase the Alabama Power Company. On May 1, that year, Mr. Mitchell and his asso-

ciates, operating as the Alabama Traction, Light & Power Company, a Canadian corporation, purchased the Alabama Power Company under this option and Mr. Mitchell became its second president.

It will be noted that the money to carry on the projected developments was obtained in February, 1912, whereas the Alabama Power Company had been formed in December, 1906. Thus approximately six years of heartbreaking labor had gone into the task—a fact that might be remembered by those who fancy that men of wealth are waiting around every corner, ready to seize the "vested rights of the people."

In after years when millions of dollars had been spent by the Alabama Power Company in hydro-electric development, and Alabama and neighboring States had been enriched immeasurably through the coming of hydro-electric energy, Mr. Mitchell suffered the fate of so many daring pioneers and came in for some criticism from the demagogues—criticisms that he felt keenly, being a gentleman with the most exalted motives and possessing a good and sensitive soul, and doubtless he went to his death feeling that his labors had not been fully ap-

preciated. And perhaps they had not been appreciated by the thoughtless. But those who know conditions as they were and are familiar with the marvelous transformations that his money and influence wrought in the South sincerely appreciate the greatness of his work.

Inspired by the unfaltering zeal and unfailing faith of Captain Lay, Mr. Mitchell and associates completed the Lock 12 power development, and laid the groundwork for numerous developments of a similar nature, thus carrying on a work that brought hundreds of millions into the South and enriched it immeasurably by providing that great essential to human progress—cheap and abundant power.

In connection with the financing of the Alabama Power Company, it is interesting to recall that when the World War came, making it necessary for English and Canadian capitalists to suspend activities abroad, an Alabaman was found who was ready and equipped to carry on the work.

S. Z. Mitchell, an able financier, long President of the Electric Bond and Share Company of New York, but a native of Alabama, became

interested in financing the Alabama Power Company and made possible the continued enlargement of activities until today more than a million horse-power capacity has been reached.

CHAPTER VI

SENDING ENERGY ABROAD

ONE of the difficulties attending the early development of hydro-electric energy was due to the varying conditions of streams at different seasons of the year. In times of heavy and continued rains there was an embarrassment of water, while in times of drought there was a shortage.

This condition made the production of a continuous supply of electric current, at normal plant capacity, extremely uncertain, and in contracting with customers for supplying current the producer had to be governed by the minimum capacity rather than by the normal. Therefore considerable waste resulted.

To meet this situation the first thought was to provide auxiliary steam plants, to be operated in times of drought and thus supplement the output in times of low water. Some such plants are built, economies being effected by placing them at or near the coal mines when this was feasible.

Then came the thought of intercommunicating systems, under which power plants in one part of the country might serve plants in other sections when droughts occurred. Back of this idea was the knowledge that droughts rarely are universal; that while one section may experience limited rainfall at some season, others might, at the same time, be receiving an abundance of rain and thus have ample capacity for taking care of surplus demand. Thus if streams in the Carolinas were low because of dry weather, the plants in Alabama might have an ample supply of water and be able to furnish sufficient surplus current to meet the requirements in the dry area. It was a happy thought and now is so widely applied that continuous intercommunicating systems extend from Florida to the Great Lakes.

Captain Lay, after giving the subject much study, put forth a definite proposal for plant-to-plant transmission of current as far back as 1915, in a booklet entitled "River Problems of Alabama," in which he said:

"To improve and develop our rivers so as to reap the greatest benefits which they are capable

of bestowing upon a people, the plans for their improvement should provide:

"First—Navigation, as good as conditions permit.

"Second—As full development of power, where power is possible, as would be economically advisable.

"Third—As complete a system for the impounding of the flood waters as physical and economic conditions will justify.

"Fourth—The coupling up, by one system of electric transmission lines, as many power units on other rivers, emanating from different watersheds, as economic conditions will permit."

In pointing out the advantages to be derived from developments carried forward upon this co-ordinated basis, Captain Lay continued:

"From the standpoint of conservation, the third, fourth and fifth provisions, as above suggested, are very important. These features, however, not being generally understood are not appreciated in proportion to their importance in the matter of conserving natural resources.

"To realize why this is so, let us remember that a stream is like a chain, only as strong as its

weakest link. In figuring upon the possibilities of water-power developments upon an unconserved stream, we can figure upon the results obtainable from the minimum discharge, counting practically all in excess of this to be wasted. Navigation is practically in the same category, for its efficiency is largely reckoned by the low-water discharge of the river. This being true, any system that has for its purpose the impounding or ponding of the flood or normal water discharges, or the coupling up of one or more river systems emanating from different watersheds so as to take advantage of the variation of stream flow at the various power units on the different streams, is one of great economic importance.

"For instance, in the Southern Appalachians, the source of the Tennessee River is along the western slope of the southern terminus of the Appalachian range of mountains, while the Coosa-Alabama and the Tallapoosa rivers emanate from the eastern slope. It rarely, if ever, happens that extreme low water prevails on all of these streams at the same time, therefore the coupling up of different sources of supply would be conductive to the greatest possible economic advantage.

"The advantages to be gained in the coupling

up, by one set of transmission lines, of the watershed of Tennessee and its great hydro-electric possibilities, with the watershed of the Coosa-Alabama and the Tallapoosa rivers, with their great water-power possibilities and their great storage reservoirs to act as a balance wheel to carry their electric loads over low-water periods, and to balance it up with the variations in the stream flow between these rivers, as well as to take advantage of pondage between the several units of power developments on each stream, must be obvious to every one."

The effect of such a co-ordinated development upon the flood situation as it exists from time to time upon practically all streams, also was discussed by Captain Lay at the same time, and in this connection he said:

"Another advantage to be gained in this unity of electric interests is that by a storage system, already planned for the Coosa-Alabama Rivers, under which, in addition to trebling the water-power possibilities on this river, there is created a condition under which the floods at Rome, Georgia, can be reduced fifty per cent and at Montgomery, Alabama, twenty per cent." He then pointed out the advantage of such storage

reservoirs to navigation, through making it possible to maintain proper levels at all seasons.

The subject of plant coupling, or, as it became known, the "superpower system," was taken up by the general government several years after this exposition had been given by Captain Lay, and a painstaking investigation was made through the efforts of Franklin K. Lane, then Secretary of the Interior.

Secretary Lane, long before going into the subject, made a careful study of the plans as outlined in "River Problems of Alabama," of which he obtained a number of copies from Captain Lay. Appreciation of the value of the conclusions advanced by Captain Lay was expressed by Secretary Lane, and there is no doubt that much of his enthusiasm for the great work of co-ordination of power resources was traceable to this source.

Obtaining from Congress an appropriation of $125,000 with which to carry on the work, Secretary Lane organized a commission of experts in 1920, delegating to these gentlemen the duty of making a study and survey of the populous territory between Washington and Boston and extending inland 150 miles. This territory sub-

sequently became known as the Northeastern Superpower Zone.

This commission made an elaborate study and submitted an able and comprehensive report upon the completion of its labors, the report covering the existing situation as of 1920 and anticipating it as of 1930. Emphasizing the extraordinary value of the "superpower" idea, or the hooking-up of various sources of power, as described by Captain Lay in 1915, the report of the Federal Commission declared:

"Had superpower been in operation in 1920 a saving of about 30,000,000 tons of coal, having a value of $165,000,000, could have been effected, and by 1930 the superpower system should effect a saving of 53,000,000 tons of coal per annum, with a value of $286,200,000, when compared to the present practice."

The commission also reached the conclusion that a corresponding saving could be effected in every zone in the United States by the establishment of superpower systems.

A year later, in 1921, a second survey was made under the authority of the War Department by a board of government engineers,

headed by Col. Charles Keller, the territory covered being described as the Southern Superpower Zone and including the Southeastern States.

This board, following its investigations, also submitted a report in which the value of interconnected systems was strongly urged, and the following reasons for such systems were given:

"First—The increased reliability of operation.

"Second—The reduction of the total reserve capacity required for an interconnected system over the aggregate amount required in separately operated systems; and, further, the better utilization of the reserve capacity.

"Third—The advantage arising from the diversity of loads existing in a large system.

"Fourth—A diversity also in the natural stream flow between the drainage areas, both during the season of any one year and during the longer periods of a year or more; it has been found that the flow in one stream is above its own average flow, while during the same period the flow in another stream of an adjacent drainage area is below the normal flow.

"Fifth—A reduction in the amount of steam power required for an interconnected system over the aggregate amount of steam power that

would be required in separately operated systems;

"Sixth—The maximum operation of the most efficient steam plants to supply any given amount of steam power required in the combined system from the viewpoint of economy and coal transportation.

"Seventh—The economy possible in plant construction whereby any newly constructed plant will be loaded up in shorter time, such new power-plant additions will be built in successive steps instead of several plants, one for each separately operated system, being constructed simultaneously.

"Eighth—The possibility of more judicious location of steam plants, such as coal-producing centers and at points accessible to condensing water.

"Ninth—Secondary power in large lots made possible by the summation of small amounts of secondary power existing in the separately operated systems, but occurring simultaneously, which may be used for aluminum or other electro-chemical processes."

The report, from which the above extracts are made, also gave a comprehensive study of the Muscle Shoals development and so impressed

were the engineers with the theory of interconnected systems that they strongly urged the inclusion of the Muscle Shoals plant in the Southern Superpower Zone, concluding an extended review of the situation with this expression:

"It therefore appears that a broad and well-founded judgment would dictate that the Muscle Shoals development should be interconnected for exchange of power with the existing power systems of the Southern State and that this interconnection and exchange should be arranged for without delay, so that future construction, both at Muscle Shoals and elsewhere, can be directed for the production of plants which will supplement each other for economy of construction and operation."

While these governmental investigations were in progress the interconnected system advocated by Captain Lay had been put in operation in the South with initial results such as are described by the Raleigh, N. C., News and Observer of Oct. 28, 1921:

"Beginning today the Carolina Power and Light Company will furnish full service to sixty large cotton mills and more than a score of other

important industries that have been forced to shut down for two and one half days each week during the present month because of lack of current.

"Resumption of service has been made possible by arrrangements that have been made to receive surplus power from the Alabama Power Company. . . . Current is not actually passed from Alabama to North Carolina, each of the intervening companies simply giving the company next in line an amount equivalent to that received.

"The linking of these large lines so as to make possible the interchange of current . . . has never before been put in operation."

The development attracted widespread attention and was commented upon by many other newspapers. The Mobile Register of the same date said:

"Owing to the long season without quantity rainfall many mills in North Carolina which derive their power from water flow have been idle because the streams are flowing far below normal capacity, and thus have greatly lessened their ability to produce electric current. In this emergency it has been found feasible to utilize the excess current produced in Alabama, by trans-

mitting it through a number of intervening plants to Charlotte, N. C., and other industrial centers. By this means a number of mills have been able to resume operations and great numbers of people have been given employment."

At the same time the Associated Press reported the development, carrying a dispatch from Charlotte under date of Oct. 28, 1921, which read as follows:

"What is described as the 'first superpower zone' was put into actual operation this week, according to announcement tonight from the office of the Southern Power Company here, through the utilization of surplus hydro-electric power in Alabama. . . . The feat marks an epoch in electric power development, it is claimed, and brings into realization what has been a dream of engineers, industrial leaders and statesmen."

Thus was brought to fruition the conception that widely separated sources of power should be so linked that the benefits might be enjoyed by all the people in vast areas and that unemployment and waste of energy might be done away with insofar as the end could be accom-

plished through sustained and unfailing sources of power.

Since those early days of interconnected systems, the plan has spread until its value now is universally recognized and the theory is applied wherever circumstances warrant.

CHAPTER VII

THE TWELVE YEARS' WAR

THE war which swept away the South's economic structure in 1865, lasted for four years. A struggle in which it was sought early in this century to sweep away the South's chief economic advantage, continued for twelve years.

The history of this prolonged conflict has not been written and few people are aware of its nature or of the vital character of the issues involved, yet it may be said in soberness and truth that an issue bearing more directly upon the rights of the several States has never been presented in this country.

Hydro-electric energy, that mighty force which soon was to bring about one of the most amazing industrial transformations in the history of the nation, then was just coming into being. Far-sighted men realized what it would mean. They who had large investments in other sections visualized the transfer of industrial activities to the South upon an ever-increasing

scale. They evidently foresaw the greatest movement of cotton mills from New England to the South, with a transfer of textile supremacy to this quarter, and realized that many similar transitions would follow, perhaps to the disadvantage of their enterprises, and they deliberately, shrewdly sought to defeat these ends.

The problem of offsetting the advantages of the South, as it relates to power, proved quite simple in theory. They would cause water-power developments to be put under federal control and create a governmental bureau with authority to levy a royalty upon all such sources of power, with the right to change the rates every ten years! That was the answer.

Such a plan would equalize things; would make it possible so to tax water power in the South that its advantage over other parts of the country would be offset. Thus the movement of mills to the South would be stopped insofar as cheap power might be a factor!

That was the scheme, and the skill with which the campaign to put it over was carried on is without parallel in the history of the country. The campaign was conducted in the name of

conservation, and so adroit were the moves in the earlier stages that even the best friends of true conservation were deceived and cheerfully joined the movement. This was natural, as a matter of course, since they realized that the utilization of water for the creation of power is the truest form of conservation, as it saves millions of tons of fuels.

The fight was inaugurated in Washington, through a department of the government, in 1908, and continued until 1920, and it cost the nation hundreds of millions because of the delay occasioned in carrying forward power developments—all enterprises of this nature upon navigable streams being held up pending the outcome of the struggle.

To have even a superficial understanding of the issue involved one must know something of the rights relating to the streams of the nation. With reference to these rights it may be said that the general government has priority upon navigable streams, the theory being that all other interests must be subordinate to navigation.

Because of the prior right of the government, as it relates to navigation, it becomes necessary for a riparian owner—one owning land through

Mitchell Dam on the Coosa River, second in the series of great power units upon this stream, embodying the three-fold principle of power, navigation and storage of flood waters. (72,000 horsepower.)

which the river flows—to obtain the approval of the government before any improvements may be made. The site and conditions may be perfect for the building of a dam and the development of hydro-electric energy, but no such work can be carried through until it is given official sanction.

Taking advantage of this situation, and seeking to use government sanction as a lever to achieve their purposes, the so-called "conservationists" attempted arbitrarily to require the riparian owner to enter into an agreement with the United States Government as follows:

First—To recognize the government of the United States as sovereign, with full power of control; this power to be lodged in the Secretary of War.

Second—Surrender perpetual ownership in his own property in favor of a limited ownership which would be entirely surrendered to the government after a fixed number of years.

Third—Recognize the right of the Federal government to charge a royalty for the use of the water power, in any sum that, in the discretion of the Secretary of War, should be assessed from time to time.

The effect of this, as it at once became apparent, would be:

First—To destroy the rights of the riparian owner to property to which the government had no title whatever, by using navigation as a club to exact an unjust and morally questionable authority over the same, and,

Second—To destroy and annul any rights which the several states might have in property within their boundaries and owned by their citizens.

Third—The recognition of a principle of taxation under which inherent, natural advantages would be wiped out and the value of said property greatly curtailed, while at the same time creating conditions under which capital for purposes of development would be practically impossible to obtain, since there could be no guarantee of permanence, either as to earnings or ownership.

It thus becomes clear that the adoption of this Bureaucratic system would have meant the nullification of state rights and the confiscation of the rights of the riparian owner to the extent that he was forced to make concessions.

Foreseeing the colossal injury that would be

done should the confiscatory scheme of the self-termed "conservationists" be carried through, Captain Lay, who continued his opposition until victory was won, based his fight upon the Constitution of the United States and the laws of the land. At the outset, after quoting numerous legal decisions, and the views of recognized authorities such as Angell, Kent, Kinney, and Farnham, bearing upon the subject, he said:

"It can be clearly seen that there are no property rights in the United States more clearly fixed than the rights of the riparian owners to the water power on streams that flow through or wash the shores of their land. Not even is the right to home and fireside more definitely settled. It is a property right, just the same as any other right of property, and one in which the owners are protected both by the Federal and State Constitutions. For instance, the Fourteenth Amendment to the Federal Constitution says:

> " 'No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; Nor shall any state deprive any person of life, liberty or property, without due process of law, nor deny to any person within its jurisdiction the equal protection of the law.' "

(It is interesting to observe that this Fourteenth Amendment to the Constitution, which was adopted when the Southern slaves were freed, now was about to be violated by the Federal Government itself as a result of the efforts of the "conservationists" to wipe out the South's economic advantage in the matter of water power.)

Continuing his discussion of the subject, Captain Lay said:

"For the Federal Government to undertake by arbitrary methods to deprive a riparian owner of his lawful rights is, in effect, a violation of, or an attempt to violate, the constitution and laws of the land, and this, too, to the very great injury of citizens whom it is the duty of the government to protect.

"This being true, the question might well be asked, if the representatives of a government, for it can only be done by the representatives, knowingly violate or attempt to violate the constitution and laws in this way, to what extent, if any, do they violate the solemn oath they took on entering upon the discharge of their duties, when they obligated themselves to support the constitution and laws of the land.

"To say the least of it, it puts the government in

the position of the protector becoming the pillager, and as Dr. Wayland says: 'When the antidote for evil becomes the source of evil, what hope for man is left?'

"No country ever advanced socially, morally, intellectually, financially and industrially as has the United States up to this time, and this has all been done under the constitution and laws laid down for our guidance by our forefathers more than a century ago.

"Not only this, but the fundamental principles underlying our form of government, holding sacred private property, private rights and privileges, have weathered the storm for ages. Why are we now called on to abandon those safe-and-sound moorings, follow off after false Gods and branch out into untried fields of theory?

"We must insist that, on the sanctity of private property, our constitution and laws, more than all else, depends our proper further progress.

"The water powers, in their undeveloped state, along the rivers of this country belong to the riparian owners, under the sovereignty of the states, subject, of course, to the prior rights of navigation and navigation only. This is a property right, the protection of which is guaranteed by the constitution of the United States and those of the several states. The principles underlying

this fact were handed down to us by old English common law, and are almost as old as the English government itself. Not only this, but this doctrine has been upheld by the highest courts of this country, universally, since the foundation of this government. This being true, can any move to arbitrarily divest the riparian owner of this property right, without his consent, or without due process of law, and to usurp the prerogatives of the states, in this great natural resource, be anything else than radicalism rampant? If so, the application of the word conservation as used by the so-called conservationists is, as we say, a travesty and a misnomer.

"The most unfortunate feature in connection with this move, however, is the fact that a goodly number of people advocating these confiscatory measures are officials of government who are oath-bound to support the constitution and laws of the land. It is bad enough for a citizen to advocate such measures, but for an official of government, who is still resting under the obligation of his oath of office, to do so is almost beyond comprehension. From the standpoint of consistency, for an official of government to advocate such confiscatory measures right in the face of the constitution, might very properly be considered as nothing short of a crime.

"This is putting the point very strongly, but if the good people who are advocating these measures will lay aside all prejudices and examine and study the situation properly they will find this is about the predicament they are in. We are satisfied that it is for the lack of a perfect understanding of this subject and the gravity of the situation that good people allow themselves to be led astray by what they, erroneously, conceive to be the best interest of the public. That is why we put this question so strongly, to try, as we see it, to arouse them to a realization of what is unquestionably being done."

CHAPTER VIII

DEFEAT AT THE WHITE HOUSE

WHILE opposing the proposed invasions of the rights of individuals and States, as described in the preceding chapter, Captain Lay was not unmindful of the rights of the people in the matter of regulation of public utilities, and he pointed out at the time how the rights of the public might be safeguarded without an invasion of constitutional rights of the individual. He outlined then a broad and conservative policy which since has been adopted in large measure. In this connection, he said:

"There is nothing that has been better established within the last few years than the fact that a state, through a public service commission or otherwise, can regulate and control all quasi-public corporations, or individuals doing a quasi-public business within the state; and where the business crosses a state line and becomes interstate, it falls under the jurisdiction of the United States. It has been equally well established that

Jordan Dam, on the Coosa River, third in the series of power units in which the principle of navigation, flood control and power development is exemplified. (144,000 horsepower.)

effective laws for this purpose can be enacted, or changed to meet emergencies at any time.

"Railroads constructed more than half a century ago are now held, beyond all doubt, to be amenable to this rule. It is not necessary that laws should be passed looking to the regulation and control of public service corporations and individuals serving the public in a quasi-public way, before these institutions have been established. This can be done afterwards just as effectively as before. There is nothing that has been better settled in recent years than this fact also. This being true, where is the danger? Where is the wolf? Yet, in the face of all of the foregoing facts, the agitators cry out wolf, and call for quick and drastic action. From the bureaucratic element in Washington the cry comes, act quickly or we will all be lost! Is it possible that our would-be advisers in Washington are not cognizant of the above facts? It is almost enough to make us think that there must be some truth in the expression made by one of the able United States Senators recently, when he said, 'Washington was about the last place in which knowledge generally broke in.'

"In view of all the above facts, with no danger lurking in our path, and knowing the timidity that capital must necessarily feel in the face

of the wild agitation that has been devastating this country for several years, the question now arises, what is best to be done under the present circumstances?

"Who knows the needs and difficulties of hydro-electric developments and their proper relations to the public sufficiently to make equitable laws that will not, under the present circumstances, deter their development? Hydro-electric energy is practically a new field in which to operate, and is yet going through more or less of an experimental state, a stage in which irreparable harm might be done.

"Who would have known fifty years ago what kind of laws would have been right and proper to have been passed for the control and regulation of railroads? This was beyond the ken of man. Very wisely we waited until we got the railroads and learned something of their needs and difficulties as well as those of the public, and then passed laws as best we could to meet the emergencies. Even with this precaution, are the laws we passed for that purpose now perfect?

"Would it not be the part of wisdom, in the midst of the present unsettled state of affairs, and in the face of the enormous expenditure of money necessary for the improvement and de-

velopment of our rivers, to wait, as we did with the railroads, until more of these developments have been made, and learn their needs and difficulties, as well as those of the public in connection therewith, and then pass such laws as the part of wisdom will suggest?

"Alabama has nothing to fear from delay, no one will suffer very much from excessive charges for hydro-electric energy in this state. The cheap coal conditions in Alabama will take care of this situation. Those of us who have studied these conditions for years, and have tried to finance water-power developments for the improvement of our rivers, know what all of these things mean to undertakings of this kind.

"Hydro-electric developments in Alabama are probably confronted with the cheapest coal conditions of any other section of the United States. In the face of this, we are also confronted in Alabama with probably the greatest hydro-electric navigation possibilities, urgently demanding our attention, of any other section of the world. If we are to reconcile these conditions in Alabama, we must foster and encourage the hydro-electric navigation improvements of our section in every way possible.

"Furthermore, the initial investment necessary in the development of water power in pro-

portion to the ultimate benefits to be received is probably far greater than in any other business in which capital may be engaged.

"Almost any other business may be started with the minimum capital necessary for such business, and as the business grows additional capital can be provided to meet its growing demands, and in most instances the business itself will produce its own additional capital to keep pace with its progress. Railroads may and generally are constructed with stiff grades, light rail equipment and in this way put into operation with a minimum investment as compared with the ultimate outcome of the undertaking, and as the business grows new capital can be provided to meet its demands.

"In the development of water power however, the initial investment must necessarily be practically the maximum investment. As a result, the danger is, that before the business can be put on a paying basis interest charges may consume a large portion and in some instances the greater portion of the original capital. Therefore, encouragements, substantial and otherwise, though small, may prove very far-reaching in bringing about these improvements, and hence the advisability of the exemption from taxation for short periods."

As so often is the case when ends are attempted that violate the rights of the people, this movement to impose what actually would have amounted to a tariff upon water power, was begun under a cloak so disarming that not a suspicion was at first aroused. It came immediately following the launching of the first great water-power development in Alabama—the Lay Dam on the Coosa River, with its 120,000 horse-power capacity—and began with the formation of a "Conservation Congress," the first national convention of which was held in Washington in 1908.

The term "Conservation" caught the imagination of the people and the first national meeting brought together in Washington one of the largest and most representative gatherings ever assembled in that city. Over three thousand men attended, including able advocates of water-power development, who felt that to utilize the water resources of the nation would be in entire harmony with the expressed purposes of the organization. Water being an imperishable element, they felt that its utilization would save millions of tons of perishable fuels, such as coal, oil and natural gas.

Therefore they were enthusiastic in their support of the movement. Captain Lay headed the Alabama delegation and made an address in the course of which he pointed out the fact that the Coosa River would develop a minimum of 120,000 horse power and added this significant observation:

"It would take to develop this amount of horse power per annum by steam, according to standard tables, 1,242,000 tons of coal. . . . This is not all. With the proper conservation of the waters of this stream, this power can be trebled; increased to 360,000 horse power. This means that it would require 3,726,000 tons of coal per annum to produce by steam the power of this river, and the cost would be $7,452,000 per annum. (The Coosa now develops over 450,000 horse power, which shows how conservative were the estimates of Captain Lay.)

"Suppose for a moment that the coal fields of Alabama were sliding down an incline and pouring over a precipice into fathomless space at the rate of 3,726,000 tons per annum, how long would it take the people of the United States to get busy and try to stop such a waste of God-given resources? Yet what else are we doing

when we sit idly by and let the water in this stream go to waste over a precipice while we ourselves burn up the coal?"

He then pointed out the relation of all similar sources of power to the subject of conservation, emphasizing the fact that the use of fuels tended to waste, while the use of water effects direct savings.

His address was in entire accord with the popular conception of the term "conservation," which was assumed to imply the thought of conserving that which could not be replaced, by the utilization, as far as possible, of that which is inexhaustible. What he had to say was in line with the thought and purpose of the Conservation Congress and it did not appear during the initial session that there was in the movement any design other than to carry out the purposes the name implied.

Indeed, it was not until after the first Conservation Congress had adjourned that the design of some of its promoters appeared on the surface. It had been made clear during the session of the Congress that there must be some means of regulation; some authority before which such subjects

as water-power development could be brought and which would have authority to approve or disapprove proposed developments. Therefore, a committee was appointed to wait upon the Commerce Committee of the Senate with a view to bringing about the creation of a Commission which should have authority in these matters.

At that time each separate proposal had to be carried before Congress and Congressional approval obtained. This, of course, was a slow and tedious process and meant vast delay in the expansion of the water-power industry. Not only so, but it meant a lack of definite policy with reference to these developments. Therefore, the creation of a governmental agency to handle such matters was deemed eminently desirable

It was only when the Committee from the Conservation Congress appeared before the Senate Committee that "the cat was out of the bag" so to speak. It then appeared, for the first time, that the real purpose was not conservation but what in substance was confiscation—usurpation of State and individual rights and inauguration of govermental control with unlimited govermental right of taxation.

Captain Lay, who was a member of the com-

Martin Dam, on Tallapoosa River, 150 feet high, forming one of the largest reservoirs in America. After passing through two other plants, the waters flow into the Coosa, aiding navigation. (135,000 horsepower.)

mittee, took the floor when the real purpose had been made plain, and threw a bombshell into the proceedings by declaring that if any such idea was in the mind of the Conservation Congress when the committee was created he did not hear it expressed, and that he was unalterably opposed to such a plan.

This forced the issue and precipitated the "twelve years' war" which culminated finally in the passage of the existing water-power act.

This, as has been shown, was in 1908. Four years later, in 1912, the advocates of water-power development, led by Captain Lay, succeeded in getting a general water-power bill through Congress, though it passed the House by the narrow margin of seven votes. The fight then shifted to the White House, where President Taft then was Chief Executive of the nation, with Mr. Stimson as Secretary of War.

It soon developed that Mr. Stimson took the view that the government should have the right to control and to tax, and had communicated these views to the President, who was reported to be disinclined to sign the bill, out of respect for the views of the taxation advocates.

Thereupon a delegation, headed by Senator

John H. Bankhead, of Alabama, waited upon the President and urged his approval of the measure. The President indicated that he would not sign the bill unless it preserved the principle of taxation, and thereupon Captain Lay frankly stated that rather than sacrifice the rights of the people and the States he would see the bill fail.

Mr. Taft then told the delegation to see Mr. Stimson and get the matter straightened out with him, and there it ended—four years' work gone for nothing and water-power development, destined to bring about one of the most remarkable industrial revolutions in the history of the world, indefinitely delayed insofar as navigable streams was concerned.

While this fight was pending and the fate of the water-power bill hung in the balance—and with it what seemed the fate of the development into which Captain Lay had put so many years of labor and practically all his financial resources—the issue was discussed between Mr. James Mitchell, financial backer of the Alabama water-power developments, and Captain Lay. Mr. Mitchell, a gentleman of the highest character and loftiest ideals, said to Captain Lay:

"If you feel that the attitude of the government is reasonable and fair, we will submit and bear the consequences; but I leave it entirely with you."

"Rather than sacrifice the principle involved in this issue, I would see the whole project fail, for I do not feel that we have any right to surrender a heritage that belongs to the people," Captain Lay replied.

"Then we will fight it out along those lines," said Mr. Mitchell, and so the struggle continued for eight more years.

CHAPTER IX

VICTORY AT LAST

No sooner had the lines been drawn between the advocates of conservation through the development of water power, and the advocates of governmental taxation of water power, than a nation-wide crusade was opened to implant in the minds of the people the idea that water power should be made to pay tribute to the general government.

Meanwhile the discussion had begun to attract widespread attention and industrial leaders were becoming aroused to its true significance. As a consequence the ranks of those who saw the wisdom and the justice of the principles maintained by Captain Lay were steadily increased. Able leaders of public thought joined in the movement and soon the subtle arguments of the taxationists were being answered with great skill. But the fight was long and bitter, one result being to bring about a split between the Conservation Congress and the taxation advocates.

The Conservation Congress had been managed

loosely. It was not uncommon for the sessions to be thronged with clerks from various governmental departments and they voted to sustain the administration viewpoint. Neither the constitution nor bylaws of the organization were observed.

Noting this condition, the advocates of conservation throughout the country were brought together by Captain Lay and a few friends and a program was mapped out to introduce order in the organization and compel obedience to the rules. To this end, a credentials committee was appointed at the next meeting and this committee prepared an official list of accredited delegates, as provided under the constitution and bylaws.

What this meant did not appear to the old leaders of the taxation school until a motion was put and some one demanded a roll call. Then, when it was realized that the organization had passed from the old régime, with its bulwark of clerical assistance from the various departments, the leaders among the taxationists retired and organized a new movement all their own.

This new movement was termed the "Conservation Association," and no higher tribute could be paid to the organization ability of its pro-

moters than to say that they succeeded in enlisting some 300,000 persons in the association at one dollar each. Thus a large fund for propaganda purposes was provided.

Many persons doubtless thought they were joining the Conservation Congress when they united with the Conservation Association, but this is beside the point. The taxationists had created a new and powerful agency and used it with great effect—so much effect, indeed, that they were enabled for more than a decade to defeat water-power development upon streams over which the government exercises control in the matter of navigation.

What this campaign, in the name of conservation, cost the people of this country through delayed development of a great natural resource, there is no way of estimating, but certainly the total was very large. At the time the taxationists were carrying on the agitation and defeating every effort to obtain a water-power bill under which progress could be made, scores of developments were brought forth, only to fade out because of the uncertainty and delay.

In the decade following the final passage of the water-power bill in 1920, hydro-electrical

developments were brought about representing investments of hundreds of millions of dollars. In view of this circumstance, it is fair to assume that had the fight ended ten years earlier, a correspondingly large sum would have been invested during that decade. So, while any figure would be a guess, it is fair to assume that the fight of the taxation-confiscation element cost the nation a sum approaching a billion dollars in retarded development.

Nor was the monetary cost the only item. It deprived millions of people of benefits that they would have derived from hydro-electrical energy. The burden of toil would have been lifted from the shoulders of millions a full decade earlier, and the whole nation would have felt the beneficial effects of the development and grown during that decade at the same pace that it moved forward beginning in 1920 when the brakes finally were removed from the rivers of the nation and they at last were free to furnish energy and to deliver it anywhere from the crowded city to the remote settlement.

But the taxation advocates may be credited with achieving one constructive result—they helped to fix national attention upon water-

power developments by the very force of their denunciation of those who sought to bring about these developments without the sacrifice of the principle of state rights. The taxationists put the water-power advocates in the attitude of endeavoring to seize one of the nation's richest assets and by their vehemence and their frequent exaggerations caused capital to begin to take notice.

The men who were trying to interest capital in water power were having a most difficult time. Capital, as always when a new thing is proposed, was exceedingly diffident. It has been shown that Captain Lay had been forced to obtain money in England and Canada. But so great was the din now being raised that money began to cock its ears, so to speak. It began to think that there must be something to a movement that was creating so much turmoil, and presently it became possible for a person with a water-power project to get a hearing.

However, in spite of the fact that the shouting and the tumult served to create interest and made it possible for water power to get the ear of capital, it was not possible to obtain results on a commensurate scale until the issue of State

Spillway at Martin Dam, showing the rush of waters which, passing through three successive plants, turn the wheels of industry in cities hundreds of miles distant.

rights versus government tribute had been fought to a finish.

The reason for this was, of course, obvious. No one knew how the struggle would terminate; the government might have the right to levy tribute, or it might not. The government might have the right of arbitrary purchase at the end of a series of years, or it might not. Capital could not tell where it would be; therefore it held off.

The fight continued until 1920, when the present water-power bill finally was passed and was signed by President Wilson. But even then the victory was not so complete as it might have been. The so-called "conservationists," fighting to the last, won out upon the issue that the government should have the right of ultimate purchase of water-power plants.

Lining up behind the "government ownership" fallacy, they forced through a provision under which the government might acquire hydro-electric plants after the expiration of fifty years. They sought at first to make this ten years, realizing that this would make the enlistment of private capital impossible and thus defeat the whole movement; but in the end they had to accept the fifty-year period.

But while this fifty-year clause constituted a sop to the opposition it is altogether likely that it will prove an empty victory. The right of the government to exercise duress in forming contractural obligations with citizens is doubtful at best, and there is a considerable likelihood of the courts ruling otherwise should the issue ever be presented.

For the government to undertake to exercise this option, would be to put it in the attitude of confiscating property that belongs to citizens who enjoy the protection of the Federal Constitution, and it is reasonable to assume that the courts would prevent it. However, the issue may never be passed upon in view of the fact that the likelihood of the government attempting to exercise the option is exceedingly remote. There is no more reason for the government to go into the power business than into the grocery business, the coal-mining business or the business of making furniture, and there is as little probability of it so doing.

In its significance to human progress upon this continent and its relation to the inherent rights of the people to enjoy the blessings with which nature has endowed them, this battle of twelve

years was without precedent in the history of this country. It far outweighed the economic importance of the slave question, slavery having been approaching its end before the war of 1861–65, and therefore would have become a dead issue in any event in the course of time; while water power is a fixture, having an intimate relation to the welfare of the people of today and for all the days to come, so long as the race survives.

While engaged in this struggle for vindication of the principle of State rights, Captain Lay made numerous addresses before commercial bodies and others, assailing vigorously the trend toward paternalism in government. Typical of his discussions along this line are the following extracts from an address delivered in March, 1911, before the Southern Commercial Congress in Atlanta, Georgia:

"It seems that within the last few years there has developed a very strong and active school of the old Hamiltonian paternalistic persuasion, which believes the centralization of power in the Federal Government, giving it absolute dominion over our navigable rivers, is of greater importance than the government co-operating with

the individual in the development of these streams. This school, like those in the days of Alexander Hamilton, is composed of some of our most worthy and able citizens whom we all honor and respect, yet we cannot agree with them. It occurs to me that the progress of the United States thoroughly proves the wisdom of the Jeffersonian doctrine, the principle of which was, to maintain the individual rights at the highest possible point.

"I have the honor of being chairman of the Alabama Conservation Commission. I am a very strong Conservationist, but not a Paternalist. I believe in conserving our natural resources for the people, but not from the people.

"I think one of the greatest needs of conservation today, is to conserve the fundamental principles of our government. That form of government under which we have lived and prospered so long.

"No other country ever advanced industrially, financially, morally, socially and intellectually as has the United States up to this time of its existence, and this has all been done under the policy of maximizing the scope of the individual and minimizing the powers of the Government, a policy laid down by our forefathers

when their battle cry was, 'Least government, best governed.'

"Why are we now called on to change the policy of our Government, striking down the individuality of man, at a time when our progress was never greater nor grander, and establishing in its place a species of paternalism?

"A nation is strong and independent in proportion as its people are self-reliant and self-dependent. Paternalism is a prolific source of dependence and weakness. Destroy the individuality of man, and you destroy the ingenuity and pride of man. Destroy the individuality, ingenuity and pride of man and you destroy the life and hope of a nation.

"Tutoring paternalism begets weakness, but individuality and co-operation give life and strength."

CHAPTER X

GOVERNMENT OWNERSHIP

SINCE the general power act under which hydro-electric developments are going forward today, gives the government the right of purchase at the expiration of fifty years, the subject of government ownership and operation of business enterprises is certain to attract increasing attention, and this is as it should be. Only through intelligent consideration of the subject, in its relation to the governmental and to the national economic structures, will it be possible to bring about that crystallization of public sentiment that is essential to wise procedure.

Therefore a brief digression may be pardoned while some phases of this increasingly important issue are discussed, not so much from the standpoint of any single industry or enterprise, but rather in its relation to the general well-being of the people as a whole.

The economic phases of the subject have been treated at length upon many occasions, but not

so much attention has been given to its influence upon the body politic—its relation to those essential functions which government primarily is created to discharge—and it is largely to these factors that attention would be drawn.

The issue involves much more than the surrender to the general government of a power that might be used to the advantage of one section and to the disadvantage of another, through the simple process of manipulating rates as the tariff is manipulated, and an understanding of these factors is quite as important as a complete grasp of the more familiar aspects.

In the first place, government ownership and operation of business enterprises upon a larger scale and sustained basis, introduces an unknown equation. Precedents under this government are rare and isolated. There is no comprehensive fund of information upon which one may draw in trying to find an answer that is clear, definite and final, as that two and two, when added together, make four.

Not only so, but such a sum of knowledge is impossible of acquirement save after long practical experience, and should this practical experience be gone through with and the ultimate

answer prove negative, then it might be entirely too late to turn back and restore that condition under which the government constituted an instrument of service only, leaving the field of business to the initiative of the public.

Broadly speaking, there are no unanswerable problems connected with the erection and operation of familiar enterprises when initiated by the individual. But this is not true and cannot be true when the government invades the field.

Investors in undertaking the development of hydro-electric power, for instance, today may obtain figures upon installation and operation—based upon wide experience—that will show the fractional cost of generating and delivering a kilowatt hour, and fix their charges accordingly. Therefore the speculative factor is reduced to the minimum.

Avenues of equally authentic information are open to the government, but they remain open only so long as price factors remain the same, which they fail to do when the government steps in. Then an item that must be considered is the cost of political management. And at this juncture the unknown equation is encountered. Here the fund of approximately exact knowledge is ex-

I OWN THIS WATER-POWER AND HOLD YOUR DEED TO IT. I WANT TO DEVELOP IT UNDER THE SOVEREIGNTY AND CONTROL OF MY STATE IN A MANNER THAT WILL IMPROVE YOUR INTEREST, NAVIGATION.
PATENT
WARRANTY DEED
I KNOW YOU OWN IT; MY SUPREME COURT HAS ALWAYS CONCEDED THAT FACT. MY CONSTITUTION GUARANTEES YOU PROTECTION IN YOUR OWNERSHIP AND I HAVE SWORN TO UPHOLD THE CONSTITUTION BUT-? HOLD UP YOUR HANDS.

Cartoon which was used in defense of the constitutional rights of the states, and the riparian owners, during the 12-years struggle over the question of unlimited Federal taxation of water powers.

hausted. Answers no longer are furnished by established mathematical processes. Variable elements enter and any answer becomes a guess.

One element guesses that government ownership and operation will be more efficient and more economical.

Another guesses that it will be less efficient and less economical.

Either of these elements may be right, since neither may be shown positively to be wrong. But, granting that this might be done, then the answer would be but partial.

Government ownership involves much more than the matter of profitable management and satisfactory service. It affects vitally the whole structure of government and the relation that government bears to the governed.

Yet before leaving the matter of cost and service, it may be permissible to suggest that a fair conclusion is that governmental operation would prove the more costly, nor is this conclusion in any sense an indictment of the ability or character of the public official. It happens to be something that is out of his line.

The fact may not be too strongly emphasized that government is a political institution—politi-

cal in the highest sense. It is an institution created to achieve ends quite apart from industrial accomplishment, and it would be unreasonable to assume that it should function perfectly in a field so foreign to its elemental purpose.

The difference between private and governmental enterprise is generic. Differences are as fundamental as differences in race; as different as the white from the black.

Private enterprise is born to earn profit. Government is born to protect and to serve.

Not only is it true that this generic difference exists; it is true also that the field of government and the field of business are as different as the practice of medicine and the practice of plumbing.

What government is, why we have it and what it is supposed to do, are questions to which the popular mind turns all too rarely. Yet they are questions inseparably associated with all governmental adventures into the unknown.

Stripped of generalities, it may be said that government is an agency created to perform certain duties that devolve upon the head of the family. Government is the hired man of the collective household.

The head of the household hasn't time to teach classes, to fight fires, to police the neighborhood, to clean and repair streets, to combat diseases, to supervise parks and playgrounds, to try the lawless, to settle differences between neighbors. So he creates an agency to perform these diverse functions, and terms it Municipal Government.

Other duties and responsibilities of a slightly wider scope rest upon him also, and he creates a second agency, and calls that County Government. This agency relieves him of the immediate responsibility for the conduct of rural schools, the upkeep of outlying highways, the inspection of dairies, the administration of justice, and so forth.

Nor does responsibility end here. Larger geographical divisions have come into being, involving duties far beyond the capacity of the individual personally to discharge, so he creates another agency and calls it State Government.

But not even this ends his responsibilities. He has become part of a far-flung empire whose orderly conduct is of supreme importance to his household. To meet these responsibilities, which involve chores ranging from delivering com-

munications to throwing an army in the field in the event of an attack, he creates a fourth agency, and he calls that the National Government.

In following these inevitable developments, it is important to note that in the creation of every agency the high purpose has been to protect the lives, the health and the property of the collective household and to promote its welfare and protect its liberty. It is profoundly significant that at no stage of the creative process has the making of profit become a factor.

The elemental fact that government is the hired man of the household, having duties and responsibilities foreign to the accumulation of monetary earnings, furnishes an excellent reason why the government cannot function at par when thrown into the field of industrial or commercial endeavor.

Government is born to ends other than money-making; is committed to loftier purposes than dollar-grabbing, and should its course be diverted it would be unfortunate for the people who so freely have delegated authority with a view to deriving social benefactions.

It is the rule to speak lightly of the politician. Yet to be politically minded is to be so trained

or so constituted as to give constructive thought to the well-being of the body politic—to be apt in the conduct of agencies that are committed to the service of the people. Therefore, it is no indictment of the politically minded to say that they are less competent to run business enterprises than are those who got their bent and received their training in the school of commerce or industry.

The politically minded rarely are profit conscious; the profit conscious rarely are politically minded. Each type of mind is admirable; each has its place in the scheme of things, but these places are not and cannot be interchangeable at will. Indeed, it may be said in all truth that the greatest disappointments in the field of political science have been furnished by the so-called "practical business man." And candor requires the admission that the politically minded have furnished quite as many disappointments in the field of business.

Since it is clear that the political mind must dominate if the highest degree of efficiency is to be maintained in rendering essential services to the public, it becomes equally clear that the extension of the functions of government into the

field of business endeavor will result in inefficiency.

In brief, if the government is to invade the domain of business, it means a change of ideals, accompanied by a changed mentality on the part of those who serve the public. The man to whom government is the science of conserving the lives and the property of the whole people and promoting their general well-being, must give way to the man who thinks in terms of interest, cost, depreciation, turnover, and so forth.

What will happen to a government that is part school and part counting house; part factory and part health department; part policeman and part producer; part merchant and part militia? The sum of these problems is not available. No man may with certainty proclaim that it will end thus or so. However, experiments now are going on in Russia which ultimately may bring enlightenment. Meanwhile the people of this nation well may congratulate themselves that the laboratory of experiment is far removed and that they may await results without incurring the risk of penalties.

Considerations of efficiency and economy in the conduct of business enterprises by the govern-

ment do but touch the hem of the garment, yet much is heard on this score. To negative suggestions the answer is made that the government now is in business and that these activities as a whole are conducted with efficiency. Attention also is directed to the fact that occasions arise when it becomes necessary for the government to enter the business field. To grant the correctness of these conclusions does no violence to the general principle that such activities are freighted with danger to the body politic.

Few question the duty or the right of the government to venture upon a business enterprise when the existence of such an enterprise is essential to the welfare of the whole people, and private enterprise has failed to function. But nothing in the genesis of our government may be construed as authorizing business ventures for considerations other than the popular well-being.

The Panama Canal furnishes an impressive instance of government operation in the line of duty. To shorten the haul upon merchandise and thus reduce the elements of time and cost, bears directly upon the prosperity of the people. And because it has this bearing it is in line with the high purposes of government. But if the useful

functions of the Panama Canal had been supplied by private capital and initiative, its creation would not have fallen within the boundaries of legitimate and constructive service such as the government is created to discharge.

With the passage of the years, the structure of government has grown to such magnitude and its activities have become so diverse and complex, that haze overhangs the boundary lines, occasioning many differences of opinion among students and laymen alike. Therefore, it may be well to return again to the point of beginning.

Long ago the "head of the household," finding himself unable personally to discharge certain duties and obligations, all intimately related to the well-being of his family, got himself a "hired man" and began to render service by proxy; teaching, policing, administering justice, building highways, fighting fires, and so forth.

Now it is perfectly obvious that functions had to be performed other than those delegated to government agencies. There was ground to be plowed, crops to be gathered, grain to be ground, logs to be sawed, horses to be shod, and many other duties to be discharged. It is equally obvious that in relieving himself of the respon-

Upper Tallassee plant on the Tallapoosa River where is installed the largest turbine in the world. Here water from the Martin Dam storage reservoir is used the second time. (50,000 horsepower.)

sibilities he passed on to his government, the "head of the household" was inspired in part at least by a desire to be free to perform the tasks that had to do with the comfort and prosperity of his family. It did not occur to him to ask his government to plow his fields or gather his crops or shoe his horses or grind his corn or saw his logs into lumber. Clearly, all of these functions could be performed by private initiative.

If horses were to be shod, Bill, the village blacksmith, could do that; if wheat was to be ground, Harry, the miller, was there to perform; if logs were to be sawed, there was Tom, ready and eager for the task. The thought of asking the government to perform these tasks, while acting as teacher, policeman, fireman, health officer, judge and soldier, entered the mind of no one.

And this is about as good a test as one may apply in the endeavor to fix the line which divides the domains of individual and governmental activity. On the one hand are the duties which the individual may discharge, and on the other the duties that are beyond his capacity to perform. He can shoe a horse, or build a power plant, or operate a railroad, but he cannot police a nation,

administer justice, conserve the public health, or maintain an army.

It is possible that the government may have been able to shoe horses, grind grain and saw logs with as much skill and economy as was displayed by Bill or Tom or Harry, but in defining the field of governmental activity, those who formed the government saw no reason for attempting to deprive Bill and Tom and Harry of their means of livelihood by forcing them into competition with themselves. For, after all, this is what governmental operation of non-governmental enterprises amounts to—putting the people in competition with themselves.

Bill and Tom and Harry are a part of the government. It is their instrument as well as the instrument of any other citizen. And its purpose is to serve them well in its field and not to serve them ill by going into the horse-shoeing, wheat-grinding or log-sawing business, and by so doing perhaps deprive them and their families of the means of livelihood.

The interests of Tom and Bill and Harry have broadened as time has swept on, and instead of being individual owners of small shops and mills and power plants, they have become joint owners

of many vast enterprises—enterprises that are called "corporate" because they represent the co-operation of Bill and Tom and Harry and a great host of their fellow citizens. And who shall say that they are entitled to less consideration and less protection in their co-operative efforts than they were in their individual undertakings? Their changed position alters the responsibility of their government no whit. To be true to its purposes it must continue to function as a protective institution and to guard carefully against becoming a competitive institution.

The bulwark of organized society is the self-reliance of the people.

The strength of government is in its protection of the people in the proper exercise of the virtues of self-reliance.

And here again the unknown equation obtrudes: At what cost may we undermine the vast constructive force of individual initiative?

CHAPTER XI

WHAT POWER WILL DO

THE Southern portion of the United States furnishes what is perhaps the most striking example of the influence of electrical energy upon economic and social progress that the world has known.

Prior to 1865 the economic structure of the South was based upon slave labor. In this it differed from that portion of the country then roughly described as "the North," whose structure was based upon free labor.

In 1865, after four years of armed conflict in which the material resources of the South, and much of its man power, suffered enormous depreciation, the institution of slavery vanished. The South then was confronted with the problem of beginning upon a new foundation; of establishing a new economic basis and building therefrom.

As a matter of course, the balance of the country experienced no such difficulty. The fundamental economic situation in the North

underwent no such change as a consequence of the conflict. Free labor had existed; free labor continued to exist. Nor had the North suffered destructive invasions or been scarred by years of conflict upon its own soil.

Under these relative conditions one might assume that the South would have occupied a minor position for many generations, if not for all time. But this condition did not eventuate. On the contrary, it enjoyed unprecedented growth and prosperity—a situation that cannot be explained except upon the theory that forces of enormous potentiality were put into motion.

In considering these forces, it may be well also to consider the force derived from slave labor under the pre-war régime.

At the peak, the number of slaves in the South fell somewhat short of four millions, including men, women and children, aged, feeble and infants.

Granting that of this number there were 2,500,000 who physically were able to render ten hours per day of sustained, productive energy; this, making some allowance for duties that were performed on Sunday, would give a grand total of approximately eight billion hours per year.

To take from an industrial establishment eight thousand million hours of labor that it had been accustomed to obtain free of charge, is certain to prove disastrous, and so it proved in the South. For something like a quarter of a century the South felt keenly the loss of this energy and its development moved haltingly. But a new force then began to influence productive capacity and a new era was introduced, the far-reaching significance of which none could foresee. Hydro-electric energy entered the field.

With the coming of this form of energy the South began to grow with a rapidity excelling that of any other portion of the United States, its growth being commensurate with the development of its power resources.

So great was the development of hydro-electricity following the pioneer work of Captain Lay, that by 1929 the South was producing more power from this source than was being produced by any other geographical division of the United States. It also was producing in great volume from steam plants, the total output, from water and fuel, for the first six months of 1929 being 10,625,580,000 kilowatt hours, or at the rate of 21,251,162,000 kilowatt hours per year.

Now, since a kilowatt hour represents the labor of fourteen men for one hour, the above total must be multiplied by fourteen in order to furnish a comparison between the new form of energy and the human energy that was lost in consequence of the Civil War. This multiplication gives a grand total of 297,516,268,000 hours of labor rendered per annum by electricity as compared to 8,000,000,000 hours of slave labor rendered prior to 1865.

In brief, the South, between 1865 and 1929, had created approximately 289 billion more hours of useful energy, for utilization in its material progress, than it lost when slave labor was abolished. The utilization of such colossal forces in the performance of the year's work could mean but one thing—enormously increased productive capacity and enormously increased wealth. These figures, more than anything else, explain the transition that has taken place in the Southern States during the past quarter of a century. When power is applied things move!

The figures quoted above refer only to power produced by public utility organizations, whose figures are a matter of record. It does not include the energy produced by private plants, which, if

added, would swell the total by many billions.

To supply anything like the energy that is supplied by electrical plants in the South, would require a slave population greater than the entire population of the United States. So, instead of having something like four million slaves, as once was the case, the South has today a force equal to more than a hundred million, and it is being multiplied constantly.

As a consequence of the creation of this new form of energy, the South has been enabled to attain a degree of wealth that today approximates the wealth of the whole United States at the end of the past century. It literally has been lifted from the depths of poverty to the height of affluence by the power conveyed through so small a thing as an electric wire.

Hydro-electric energy produced in the United States for the first six months of 1929, by geographical divisions, was as follows, totals representing kilowatt hours:

Southern States,	4,954,886,000.
Pacific States,	4,616,712,000.
Middle Atlantic States,	3,428,699,000.
Mountain States,	1,642,322,000.

Lower Tallassee plant on the Tallapoosa River, now in course of erection. Here water from the storage reservoir above Martin Dam is used for the third time. (72,000 horsepower.)

East North Central States,	1,409,220,000.
New England States,	1,253,223,000.
West North Central States,	820,735,000.

To double the above figures would represent approximately the annual output of hydro-electric energy in the United States, for 1929, or about 36,251,594,000 kilowatt hours.

Fuel production of electricity, in kilowatt hours, for the first six months of 1929 was as follows:

East North Central States,	10,670,695,000.
Middle Atlantic States,	8,532,988,000.
Southern States,	5,670,695,000.
New England States,	1,988,345,000.
Pacific States,	1,350,305,000.
West North Central States,	1,292,243,000.
Mountain States,	313,484,000.

By doubling these figures, the production for the year is found to be approximately 58,531,-930,000 kilowatt hours, with a grand total of 94,783,524,000 hours for the year.

When it is recalled that hydro-electric energy is the youngest member of the power family,

the magnitude of the part it is playing in the economic scheme may be better understood. In the South, where topography and the presence of many bold streams make the generation of hydro-electric energy possible upon a scale unsurpassed elsewhere in the United States, the harnessing of this source of energy is going forward upon an ascending scale. It has reached colossal proportions in North Carolina, Alabama, Maryland, South Carolina, Georgia and Tennessee, the annual production of these six States alone being 8,794,872,000 kilowatt hours, the order being as follows:

North Carolina,	2,366,394,000.
Alabama,	1,751,762,000.
Maryland,	1,548,888,000.
South Carolina,	1,343,906,000.
Georgia,	1,063,778,000.
Tennessee,	721,644,000.

The above figures are based upon output for the first six months of 1929, and since the development of hydro-electric energy went forward steadily during the last six months of the year, it is safe to assume that the actual production was considerably greater. But as they stand, the

figures are sufficiently large to explain in some measure the tremendous forward movement that is taking place in the South.

The relation of hydro-electric energy to conservation of exhaustible resources is strikingly illustrated in Alabama, which has colossal deposits of coal. Yet in spite of these enormous stores of fuel, only a little more than twelve million kilowatt hours of power were produced by fuels in 1929, compared to over one and three quarter billion produced by water—an inexhaustible substance.

Coal, oil and gas, all familiar products in the South, as well as in other portions of the country, are exhaustible elements. Once used, they are gone and only may be replaced by the processes of nature evolving through millions of years, whereas the ancient saying that the mill will never grind with the water that is past, is based upon a fallacy. The water that goes through the turbine today as it grinds out millions of hours of energy, is gathered up by the sun's rays, carried back to the hills or mountains, and in due course returns to flow once more through the turbine. It is an endless process, attended by not the slightest waste, and every hour of energy it

produces saves exhaustible materials that otherwise would have to be used.

The importance of this feature to the welfare of unborn generations may not be overestimated. Every fuel that is drawn from Mother Earth contains byproducts that are worth more than the fuel itself. This is particularly true of coal, from whence come thousands of useful elements, ranging from drugs, dyes and perfumes, to acids, wood preservatives, paving material and roofing. In its gifts to man, coal is a veritable Christmas tree, every branch and sprout of which is rich with gifts of an almost priceless nature. When it is burned for fuel, with no reference to the byproducts, it represents an enormous waste of elements that are almost endless in variety and usefulness; materials that will be required more and more as time unfolds and the race multiplies.

And what is true of coal is true to some extent of all other fuels. The pressure that brings oil rushing from a well, is supplied by natural gas —an element of great value—yet in thousands of instances no attempt whatever is made to prevent the waste of this great natural heritage, and it is dissipated in the atmosphere, never again to be

available for the uses of humanity. The list might be extended almost indefinitely, precious elements going to waste while a fractional part of the worth of the product finds practical application.

Thus hydro-electric energy represents not only the utilization of a source of inexhaustible power, but it represents conservation in its highest form—the preservation of useful elements that will be required more and more as the race multiplies and advances. And it is an unwise and ungrateful people that thinks only in terms of its own generation.

What the development of energy has meant to the South in a material way may be gathered from a multitude of sources, but perhaps no more striking illustration could be found than is shown here:

In 1900, thirty years ago, the value of the manufactured products of the whole United States, amounted to $11,406,000,000.

In 1925, the last year complete figures were available through the Census Department, the manufactured products of the South alone amounted to $10,372,000,000—or within approximately one billion dollars of the value of the

products of the whole country twenty-five years before!

Again, the total bank resources of the South in 1928 were $10,016,205,000, compared to total resources for the whole United States of $10,785,000,000 in 1900. In brief, the South today is virtually as strong, financially and productively, as the whole country was at the beginning of the present century—a record for progress perhaps unequaled in all the history of the world.

Nor has this progress been solely of a material nature. Whereas the whole country spent $214,964,000 for public education in 1900, the South spent for education during 1927 a total of $426,290,000, or more than twice the sum that was being expended by the nation twenty-seven years ago, thus illustrating the fact that while the South has gained enormously in wealth, it is using the money wisely.

Tax payments also reflect the increasing wealth of the South. In 1927, the South paid into the Internal Revenue Department of the Government $638,257,000, an increase of $51,900,000 over the preceding year, while, for the same period, the payments of the balance of the

United States showed a decrease of $22,200,000.

Further light upon the colossal wealth that has accrued to the South largely through the utilization of its vast power resources is given by the following figures, which are reproduced from the "Blue Book of Southern Progress," published by the Manufacturers Record for 1928, which also furnished the basis for the comparisons given above:

The South Today Compared With the United States in 1900

	The United States 1900	The Southern States 1927	South's Increase, 1900-1927 *Per Cent*
Population	75,994,000	40,175,00	46.4
Wealth	$88,517,307,000	$80,000,000,000	346.4
Manufactured products	$11,406,926,000	*$10,372,185,000	563.1
Lumber	$760,992,000	*$666,340,000	184.8
Cotton	$339,200,000	*$938,366,000	846.7
Furniture	$130,634,000	*$142,861,000	816.2
Mineral products	$1,108,927,000	‡$2,016,205,000	1452.6
Coal, tons	269,684,000	273,297,000	401.4
Petroleum barrels	63,620,000	565,084,000	3204.2
Farm products	$4,717,000,000	$5,672,131,000	262.7
Exports, value	$1,394,483,000	$1,588,555,000	227.8
Imports, value	$849,941,000	$493,387,000	847.1
Banking resources	$10,785,800,000	$10,123,807,000	850.0
Deposits	$7,288,900,000	$7,329,587,000	960.0
Railroad mileage	193,346	91,672	48.5
Highway expenditures	$50,000,000	$390,899,000	3157.5
Public-school expenditures	$214,964,000	‡$426,200,000	1116.4

The transformation that has been wrought in the cotton industry furnishes a striking illustra-

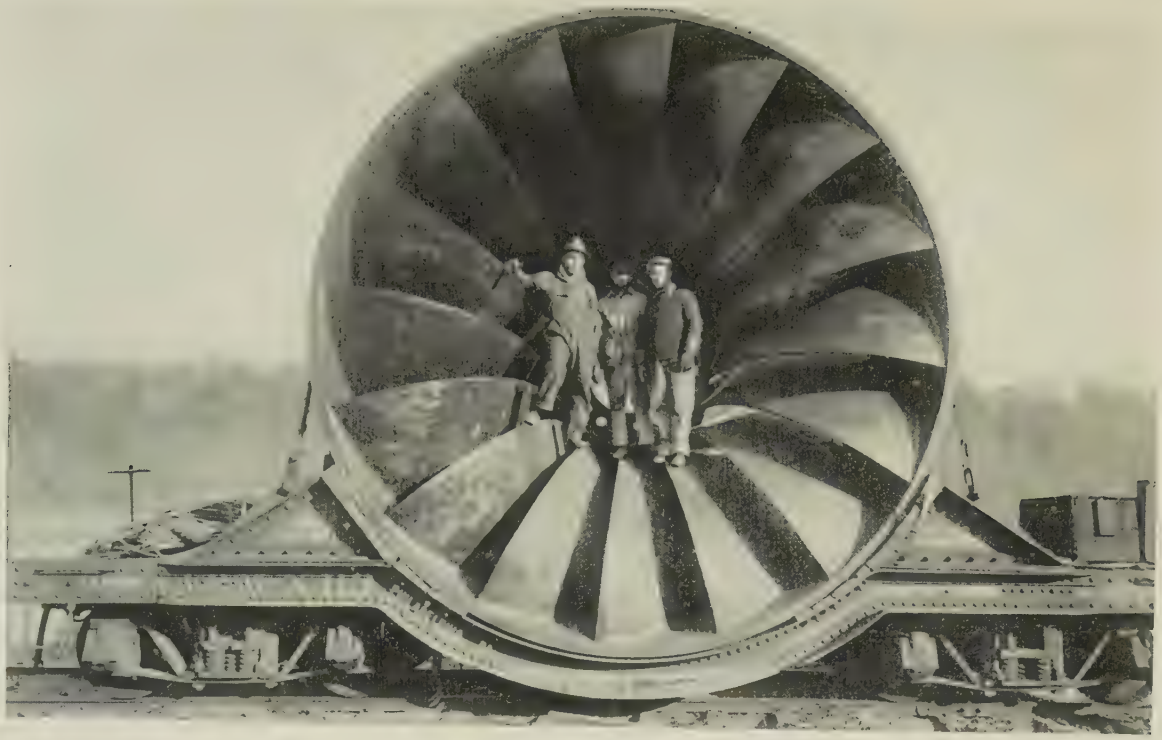
* Census 1925. ‡ 1926.

tion of the influence that cheap and inexhaustible power has upon industry. New England once dominated the textile industry of America, despite the fact that the cotton was produced in the South. But this situation has undergone a tremendous change since the advent of hydro-electric power. The South in 1927 was supplying 62 percent of the country's annual production of cotton goods, and the relative advantage is mounting steadily.

Meanwhile the rayon industry also has entered the South and developments in this line are reaching enormous proportions.

Cheap and abundant power brought diversification to the South upon a large scale and also witnessed the introduction of the chemical age. At the same time it served to speed production in a thousand familiar channels. Electricity entered the mine and the quarry as well as the mill and the factory, and raised the level of production upon every hand.

And while it was speeding production and adding immensely to the general wealth, it was, and is, performing miracles in the homes of the people—lightening the burdens and adding immeasurably to the opportunities for recreation



A modern "water wheel," constituting the largest turbine in the world, shown being conveyed to Upper Tallassee plant on the Tallapoosa River.

and pleasure, and the enjoyment of social, educational, and religious advantages.

The housekeeper, once burdened with duties which required practically her whole time, suddenly found a new freedom. Labors that once required hours of manual effort became possible of performance in minutes by the use of electricity. Even in the most isolated communities the electric light took the place of the old-fashioned lamps that once had to be cleaned and filled each day; carpet sweepers supplanted the ancient method of hauling rugs into the open and beating the dust out of them by hand; the electric iron did away with the hours of toil spent over a hot stove in keeping the old-time "sad-iron"—appropriately named—at the ironing temperature; the electric toaster browned the bread upon the table in a cool and pleasant dining room instead of at the stove in the kitchen; the electric percolator brewed the coffee without contact with the stove; a tiny motor turned the sewing machine, doing away with the wearing process of operating it by foot-power; an electric refrigerator produced ices without the turning of a freezer that became more and more difficult to turn as the substance hardened, and thus in a

multiplicity of ways the toil and burden and physical exhaustion incident to housekeeping was minimized. Women found themselves with more time to give to their children; more time to give to the church, the school improvement association and to the other community agencies that make for progress and enlightenment, and also found more time in which to cultivate the arts and graces that add to the joy of living.

Not only so, but they grew younger! Once the grinding burdens were lifted, they regained their youth. The average woman of fifty of today looks younger, feels younger and is younger than the average woman of thirty-five was a generation ago. Unremitting toil ages one quickly; reasonable toil, accompanied by recreation and pleasure, preserves youth, and the youth of millions of women is being prolonged today by that silent, sure and invisible force known as electricity.

Nor have the physical benefits of this new order been confined to women. Men share in it quite as fully—both in the center of population and upon the farm. Long-distance transmission of electricity has made possible its delivery to thousands of farms, where it performs a multitude of tasks that once required manual labor.

Electricity milks the cow, churns the milk, turns the grindstone, operates the saw, pumps the water, lights the barn and performs many other useful services. And its usefulness on the farm is just beginning to appear. Experiments show that it is capable of greatly increasing the output of vegetable growths, the production of eggs and other things of value, and the time undoubtedly is approaching when it will play a highly important part in the agricultural output of the nation.

Through the adoption of artificial means, some seventeen million farm people today are producing more than was produced by more than twenty million a few years ago, and the per-man output undoubtedly will grow as science, as it relates to electricity, expands.

Electricity has shown an enormous capacity for enriching, for liberating and for enlightening, and, at the same time, has developed a great therapeutic value. It has become an inseparable part of the equipment of the physician and surgeon.

In addition to all of these things, and a thousand others that might be mentioned, electricity has brought the world into kinship. It has de-

stroyed the meaning of distance and made easy the acquirement of useful knowledge and the tapping of the greatest fountains of inspiration. The most isolated household may hear the world's greatest preachers, philosophers and teachers; the world's most gifted singers and musicians, and may know all that is going on, from the state of the weather to the outcome of the day's baseball games or quotations on distant markets.

These results show in graphic manner the things made possible once there has been achieved the infinitely difficult task of supplementing individual endeavor by governmental co-operation and private capital.

The problem of keeping the human family alive is not solved until the labor of the hands has been supplemented by the enlistment of power greater than that of the hands, and the problem of enlisting such supplemental power is not solved until capital has been obtained. Thus, in its final analysis, capital is that which stands between the race and the specter of starvation. It is said by competent authorities, with knowledge of the past and of the present, that two million people will starve to death in China this year. This is because China lacks capital.

And, lacking capital, China fails to produce save as production is made possible through the use of the hands.

John Stuart Mills once observed that where there is a mouth to feed there are two hands to feed it, but this can only apply to the adult and semi-adult population. So long as children exist there will be more mouths to feed than there are hands to toil, and there will be hunger unless toiling hands are supplemented by the machinery that capital makes possible.

Men, in this age of machine production, when the productive capacity of the individual is multiplied many times, scarcely realize the magnitude of the problem that confronted humanity before the coming of the machine age. Malthus, one of the most widely quoted philosophers of the Eighteenth Century, undertook to meet the problem of mounting population by advocating making the ownership of property a prerequisite to marriage, thus minimizing the birth rate and holding it within the bounds of capital available to maintain life. Struggling with the same problem of excessive population and inadequate capital, John Stuart Mills advocated opening gainful occupations to women, in shops, factories

and offices, to the end that they might become producers as well as consumers and thus minimize the dangers of inadequate necessities.

While he was endeavoring to meet the many and varied problems connected with the development of power—which embraced not only the enlistment of capital but the enlistment of governmental co-operation—Captain Lay summed up the situation in this language:

"To so construct and frame the commercial laws and customs of society as to stimulate and make possible a sufficient increase in capital and production necessary to the proper advancement of civilization, and to keep pace and supply the necessities of an ever-increasing population, has been one of the great problems with which the world has had to contend in all ages.

"It has been observed that civilization advances in exact proportion as capital and wealth accumulate. The savage roaming the forests with his bow and arrow does not require much capital, but, as civilization advances, says Walker 'The rude hut is pulled down to make room for the cottage, the cottage gives way to the mansion, the mansion to the palace.' Then as children are born more mouths are to be fed and more people

are to be clothed and educated, and as they reach the years of maturity, additional capital must be provided in the channels of trade to make them self-supporting.

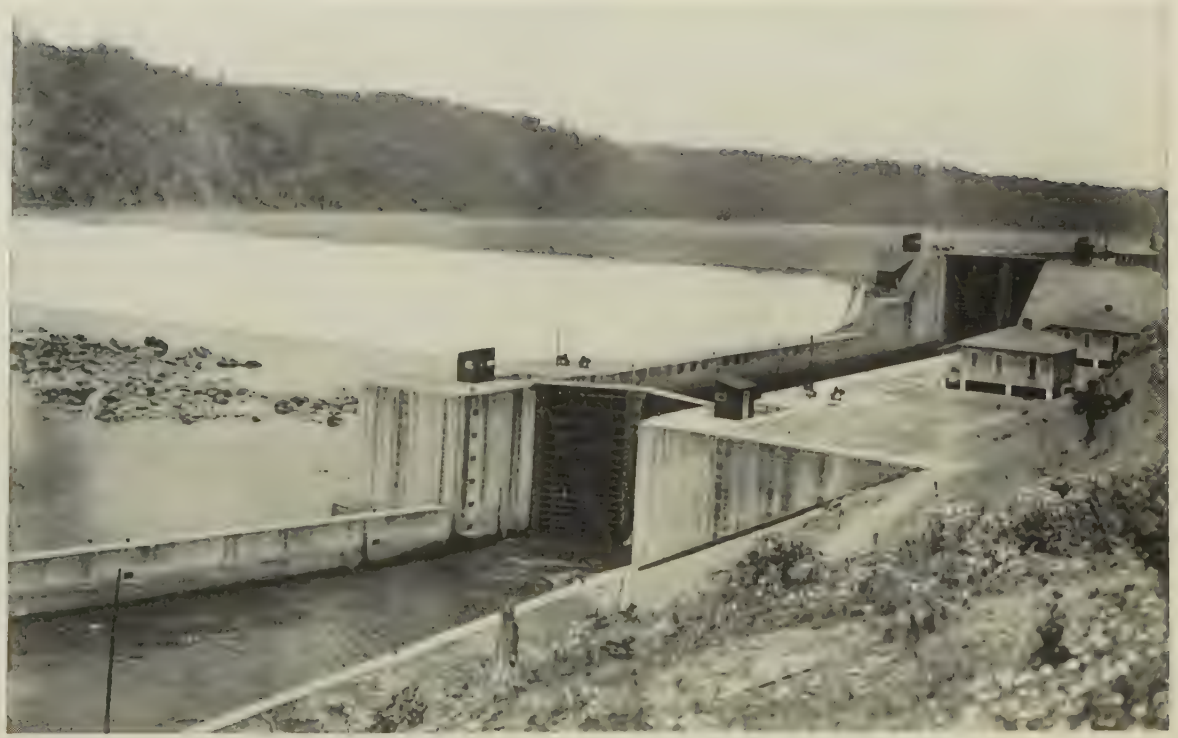
"The severest critic of modern commercial tendencies must recognize that an increase in the world's wealth, said to have doubled in this generation, has contributed much to the moral uplift of mankind, such as opportunities for education, less arduous toil, shorter hours of labor, more leisure, more recreation, freer interchange of thought, sanitary homes, appropriate clothing and diversified and plentiful diet.

"The primitive method of producing wealth and the other necessities of life by manual labor, in this day and time, is not only inhuman, but wholly inadequate. The nation, or any particular locality in a nation, that is destined to lead in the world's progress, industrially, financially, morally and intellectually, is the nation or locality that produces these necessities of life by machinery operated by mechanical power.

"This being true, it is no wonder that we find the world busy today trying to devise ways and means for a greater and more efficient production and distribution of both hydro-electric and

steam-electric power. Not only do we find them striving for a greater and more efficient production and distribution of this mighty agency of human progress, but to improve on such production and distribution so as to make possible cheaper and more flexible distribution of power to the end that the people may be more greatly benefited."

The astounding progress chronicled in this chapter proves not only the necessity of capital, but the multitudinous nature of the blessings which flow from its wise utilization.



Dam and locks on Warriot River, Alabama; an instance of lack of co-ordination in river development. Navigation is provided and flood waters stored but no power is generated.

CHAPTER XII

MOB PSYCHOLOGY

ONE of the peculiar things associated with industrial development is the workings of mass psychology. Let a community need a railroad or a manufacturing plant or a power enterprise or street railway system—a lighting company or a telephone system, it doesn't make much difference what—and there will be a grand get-together meeting to bring the thing about. In many instances money will be subscribed and the expense of delegates paid to go to some distant point to present the matter, and elaborate statistics and arguments will be submitted showing why it will be to the advantage of that particular enterprise to locate in the community. When the enterprise is located and goes into operation after large expenditures and finally is in a fair way to get back something for the stockholders, then what happens?

In a great many cases a fight is opened upon it that is reflected in adverse legislation, in lack

of public co-operation and in the multitudinous ways in which a fickle public can punish an organization of this nature.

Why this condition should exist—with the same community reaching out for other enterprises and holding forth the same dazzling assurances to the newcomers—is one of the things that pass human comprehension, yet it occurs with such frequency that industrial organizations scarcely are surprised when it comes.

The Alabama Power Company met this condition almost at the inception. When after six years of almost superhuman effort, money finally was provided with which to carry on developments and while the company had as yet completed but one of its immense power projects, a storm broke over its head that for ferocity rarely has been equaled.

This storm arose in connection with the Muscle Shoals project and arose out of circumstances that made it peculiarly unjust.

As soon as the company had begun to function, the owners of the then existing power company at Muscle Shoals got in touch with the officials of the Alabama Power Company and after considerable negotiations sold out to the Alabama

Power Company for approximately half a million dollars, the property conveyed embracing the site of the present government power plant at Muscle Shoals.

Thus, at the opening of the World War, the Muscle Shoals property belonged to the Alabama Power Company. In the midst of the war, when the United States Government had entered the conflict and every patriotic organization was doing its part to support the government, the idea of erecting a colossal plant at Muscle Shoals for the manufacture of nitrates arose, and the government became committed to the proposal. Therefore it needed the site owned by the Alabama Power Company. And it received it, not at cost, but as an absolute gift. It became one of the contributions of the Alabama Power Company to the cause of America in the World War.

In due course the war ended and the long controversy as to the disposition of Muscle Shoals began. During this controversy, the government offered to receive proposals for the property, and among those submitting propositions were Henry Ford and the Alabama Power Company.

Now one of the interesting facts in connection with the case is that the interest of Mr. Ford

was enlisted by the same group of men who had sold the Muscle Shoals property to the Alabama Power Company, which property the Alabama Power Company subsequently had given freely to the government. Having brought about the Ford offer, this group conceived the idea that the way to have the Alabama Power Company's bid rejected and the Ford bid accepted was to create as much prejudice as possible against the former. With this end in view, a campaign of the greatest bitterness was launched and charges and assaults of the most reckless nature were made. Speakers went so far as to attack the Alabama Power Company for laws before any foreign capitalists had become interested or set foot in the State, and the irony of it was emphasized by the fact that these laws in some instances had been put through by the same men who had sold their Muscle Shoals properties to the Alabama Power Company upon its entry to the State!

During the heat of the fight, a State convention was held in Montgomery, Ala., in February, 1922, when the flames of fury were fanned afresh and the fight against the Alabama Power Company was put on an organized basis. Com-

mittees were appointed to investigate certain matters relating to the company, one being "To determine when and where the Alabama Power Company was organized and who were the original stockholders," which was typical of the sensationalism of the hour, since every one who knew anything about the power situation knew that the company had been formed by three men in Gadsden who certainly were without either the ability or the inclination to devour the State of which they were natives.

Upon the adjournment of the convention and the publication of its action, Captain Lay, without waiting for the committees to get into action, issued an address to the members and that ended the matter. No more was heard of the committees or of the sinister implications which their appointment conveyed. Captain Lay's address, which serves both to answer the charges and to reveal something of the spirit of the campaign of incrimination, was as follows:

GADSDEN, ALA., MARCH 19, 1922.

"TO THE COMMITTEE OF THE STATE-WIDE PRO-FORD AND ANTI-ALABAMA POWER COMPANY MASS MEETING:

"Gentlemen: I notice through the press the appointment of your committee and, through the resolutions, the 'specific' duties assigned to you.

"Resolution No. 1: 'To determine when and where the Alabama Power Company was organized and who were the original stockholders.'

"That you may know from whom you may get the most of the information enjoined upon you as to the early activities of the Alabama Power Company, I will say: I organized the Alabama Power Company in Gadsden, Alabama, my home town, in 1906 under the laws of the State of Alabama. In the organization I owned 96 per cent of the stock; my son, Earl Lay, owned 2 per cent, and my attorney, Mr. O. R. Hood, of Gadsden, 2 per cent. In the organization I was made president; my attorney, Mr. Hood, vice-president, and my son, secretary and treasurer. I can furnish you all the information you desire about the early activities of this corporation, and I would be glad to do so. However, for fear you do not call on me and make public your findings and that silence might reflect unfavorably on the Alabama Power Company, an institution of which all Alabama should feel proud, I shall undertake, as best I can, to show some of the particulars and purposes for which this organization was created.

"To do this, I shall quote from a speech I had the honor of making before the Mobile Basin and Tennessee River Improvement Association in Mobile, November 23, 1908. I quote from this speech from the fact that it will show what I did was open and above board. This speech was printed in pamphlet form and liberally scattered all over Alabama and Washington, D. C., and many copies found their way into other States. I still have a limited number of copies of this speech, a copy of which I can furnish to any person who desires it. The portion of the speech which I copy is as follows:

" 'Perhaps it would not be out of place for me to say in this connection that I have spent many of the most useful years of my life, as well as many of my most useful dollars, in my study and efforts for the economic improvement of this splendid waterway that the best results might be obtained therefrom.

" 'At first we tried to obtain these joint results through the agency of our national government, as the observing friends of the Coosa well know, and which is evidenced on page 18 of the original memorial of the Coosa River Improvement Association, which, as chairman, I had the honor of compiling in 1898, and which is also evidenced in an address I had the honor of deliver-

ing before the Alabama Commercial and Industrial Association at its annual meeting in Montgomery, Alabama, June 20 and 21, 1901, but after many years of fruitless efforts in that direction, and waking up to the fact that the creation and use of the water-powers along the rivers of the United States in their natural state, was appurtenant to riparian ownership and beyond the control of government, and after consultation with some of the remaining friends of the Coosa, we changed the plan of our efforts so as to try to bring about these much needed and valuable improvements by trying to interest private capital in the development and utilization of the water-power in conjunction with the federal government in improving the stream for navigation.

" 'It is not to be thought for a moment that by these suggestions I would intimate that the government should relax its work of itself building locks and dams in the aid of navigation, but that by working in conjunction with private enterprises in the development of water powers at some points, and by prosecuting its own separate operation at others, the work of improving navigation will be greatly facilitated, and the expense of the government greatly reduced at the same time.

" 'With this end in view, and in connection

with a series of water-power developments I am undertaking on the Coosa River, which I expect to very materially aid navigation, I secured the services of one of the most able hydraulic engineers in the United States, who made a thorough study and preliminary survey of the Coosa River and its tributaries from away up in the Appalachians down to where it forms the Alabama, that, in connection with the able engineers of the United States government, the most perfect dual system of navigation and power development, together with the most perfect system of impounding or conserving the waters of these streams in aid of such navigation and power development might be designed. The result of this investigation is both interesting and instructive, and if properly handled, promises the most happy results.

" 'Should I be successful in getting this project of development properly on its feet, the Coosa valley will be destined to become one of the greatest manufacturing sections of the world.'

"This quotation, I think, is enough to show the good intention and purposes of the organization. If this is not sufficient evidence of the good intentions of the undertaking, I can furnish you practically any information you may desire. I will say, however, that every move that has

ever been made looking, not only to the plans for the full development of the Coosa-Alabama Rivers, but the methods by which we were trying to obtain such developments have, from time to time, been laid before the people of the Coosa-Alabama valley from Rome, Georgia, to Mobile, and always received their hearty approval. It can be seen, however, that the Alabama Power Company is today strictly discharging the duty for which it was originally organized, and this, I must insist, it is doing in an honorable and high-minded manner.

"I might say in this connection that after the organization of the Alabama Power Company in 1906, I spent six of the longest years of my life trying to find somebody with money enough to carry out the purposes for which the company was organized. Finally, at the eleventh hour, I was successful. I got people who were big enough to do it. It is true in my money chase, I scoured this country from end to end, and failing here, I finally succeeded in getting clean English and Canadian capitalists to take it up. Unfortunately, however, for this splendid group of English people the war soon came on, and owing to the stress of war in Europe, they were not only unable to furnish any more money, but were forced to unload the most of their securities

in this country at great losses. The saddest part of it all is that the leader of this splendid English group today fills a disappointed grave. And, worse than all, I fully believe the uncalled-for assaults that have been made against the Alabama Power Company at different times within the last few years are chiefly responsible for this disappointed grave."

" 'He who serves the public is a poor animal; he worries himself to death and no one thanks him for it.'—Goethe.

"Resolution No. 2: For brevity I shall only mention one of the corporations which the Alabama Power Company took over after it passed out of my hands, and owing to the state of the minds of the people at this time, I feel that I am thoroughly justified in bringing this up.

"Soon after I found people with money enough to undertake the development of the properties of the Alabama Power Company, the owners of the Muscle Shoals Hydro-electric Power Company, of which Mr. Ford's chief propagandist today was one of the owners, got in behind these English people and sold them the Muscle Shoals property, which consisted of all the property along the Muscle Shoals. After selling this property to the Alabama Power

Company, this same propagandist, during the war, was behind the move to get the government committed to the building of the big nitrate plant at Muscle Shoals. Successful in this, this same able propagandist was next seen behind the publicity move to force, if necessary, the Alabama Power Company to turn over the Muscle Shoals dam site No. 2, now the Wilson Dam, to the government to operate this nitrate plant. The Power Company, believing the government really wanted this water power for the above purposes and being ever ready to come to the assistance of the government during the war, donated the same to the government. This piece of property which the Power Company gave the government cost the company almost a half million dollars, and the company bought this property from this same propagandist and his associates.

"The government now owning this property, we find this same propagandist behind the move to have the government to hand over all of this property, nitrate plant, steam plant and all, to Mr. Ford. Any man that can get by with all of these things is certainly entitled to be called 'The Chief Propagandist.'

"The Muscle Shoals Hydro-electric Power

Company, I believe, was the principal corporation taken over by the Power Company after it passed out of my hands.

"Resolution Nos. 3, 4 and 5 refer insinuatingly to good laws on the statute books of Alabama which make possible the improvement and development of our rivers. Alabamans alone, and I know whereof I speak, and particularly Muscle Shoals parties, are responsible for these splendid and necessary laws. The laws on the statute book to which the resolutions refer so insinuatingly, were passed by the legislature of the state in 1907, five years before the present owners of the Alabama Power Company ever heard of or acquired this property. PLEASE REMEMBER THIS.

"Strange it is that some of these Muscle Shoals parties then interested in getting these laws passed should now lead a mass meeting to condemn INNOCENT PEOPLE for acts of their own, which had for its purpose the development of their own river for their own benefit. MAY THE GOOD LORD FORGIVE THEM!

"This, however, is a typical example of the assaults that are now being made against the Alabama Power Company.

"'Justice, justice, there is no virtue so truly great and God-like as justice.'

"Yours truly, W. P. LAY."

The controversy over Muscle Shoals, which attained nation-wide proportions, continues until this day, and as these lines are written a Congressional inquiry is in progress covering the activities of lobbyists who, from time to time, sought legislation on the subject.

Testimony of the president of the American Cyanamid Company, before the lobby committee, revealed that this company had expended approximately $160,000 in propaganda in behalf of its bid for the plant, one of the men active in its behalf being the "chief propagandist" to whom Captain Lay referred in the communication quoted above.

What the final outcome of the struggle over Muscle Shoals will be remains problematical after more than a decade of controversy, but nothing has occurred to dull the force of the recommendation of the Federal Commission which is quoted in Chapter VI of this work. This Commission created by act of Congress and working under the direction of Franklin K.

Lane, concluded its summary of the power situation in the Southeast with the declaration that Muscle Shoals should be tied into the Southern Superpower System, its surplus resources to be used as needed to supplement the flow of useful energy to points in the South.

CHAPTER XIII

ROMANCE IN BUSINESS

EVENTS that are almost unbelievably strange run through the fabric of business, as well as through the carefully spun romances of the fictionists. And this is one of the things that holds the business man to his task. He never knows at what hour some new and surprising event may turn up, any more than does the scientist who browses among the ruins of ancient temples.

In 1902 Captain Lay, who had been as actively engaged in the development of his home city of Gadsden as in the promotion of water-power developments, learned that the Alabama Steel & Wire Company was seeking a location, and he promptly got in touch with the responsible persons and enlisted their interest in Gadsden as a place of operation.

Convinced that he could obtain the plant were a suitable site offered, Captain Lay found the right property and then called a meeting of representative citizens. To them he said in sub-

In 1906 the office of the Alabama Power Company was in the library at the home of Capt. Lay in Gadsden, Ala. Above is shown the office of today at Birmingham.

stance: "I have something good for the city but am not permitted to mention what it is, but to obtain it will necessitate an expenditure of thirty-five thousand dollars for a site."

With no other information, the money was subscribed and the site bought and the plant located as Captain Lay had promised.

This disposed of, Captain Lay went about his work of promoting power development and, as has been shown, finally succeeded in interesting capital in the Alabama Power Company project. Years passed and then came the announcement that the steel mill was in the hands of a receiver. Following this came word that engineering experts had been called in and had recommended the scrapping of the plant and the liquidation of the enterprise.

In view of the fact that hundreds of thousands of dollars had been invested and the conditions were ideal for steel production, Captain Lay was very much disturbed over this development and took the view, soon expressed by the minority stockholders, that the enterprise should not be scrapped. Opposition of the minority to the abandonment of the plant took the turn of a demand for a second survey by a different firm of

engineers, and this finally was agreed upon.

The second survey was made by Coverdale & Colpits, of New York, but the report, when submitted, was so carefully guarded that outsiders were unable to learn the nature of its contents. However, Captain Lay happened to meet a friend in Birmingham who had access to a copy and loan of this copy was obtained for half a day. Upon examination, Captain Lay saw that the report recommended not the abandonment of the enterprise but the elimination of certain obsolete holdings in other communities than Gadsden, the acquirement of additional coal and ore lands and the substitution of hydro-electric energy for steam power.

The report called attention to the fact that preparations were being made by the Alabama Power Company to supply current and suggested an arrangement with this company for power. But the "sting" in the report was found in the conclusion that it would take approximately $2,500,000 to carry through the plan of rehabilitation. This was highly disconcerting, since the bankers who had financed the proposition were on record as saying they would not invest another dollar.

Captain Lay, seizing upon the possibility of obtaining a client for power, had the essential portions of the report copied and sent the papers to James Mitchell, in New York, marking those portions which related to power.

Mr. Mitchell, who, as has been stated, was then at the head of the Alabama Power Company, went at once to see the bankers and asked them what they intended doing about the steel mill. They answered that they were going to drop it; that they did not intend investing anything more in it.

Mr. Mitchell urged that this would be a mistake and concluded the interview by saying that he would put a half million dollars into it if the bank would go ahead with the project along the lines of the Coverdale & Colpits report.

That put a different face on the situation at once. Here was a man with faith and the money to back it, though he owned none of the property, while the bank had the property but lacked the faith! It was worth thinking about, and the upshot of it was that the plant was rehabilitated, was electrically operated, and, as the Gulf States Steel Company, became one of the great industrial enterprises of the South—is even now

spending over $17,000,000 in enlarging its facilities!

Thus Captain Lay, who brought the steel plant to Gadsden in 1902, succeeded in saving it in 1913–14, and all because in the interim he had been able, after six years of labor, to interest a capitalist who had vision as well as wealth. Few things in fiction offer a more interesting or surprising chain of circumstances, and still another interesting fact is that Mr. Coverdale, who made that report, pointing to hydro-electric power as one of the means of saving a bad situation, now is the president of the Gulf States Steel Company and has carried it to conspicuous success.

These activities in the upbuilding of Gadsden and Alabama might be multiplied almost endlessly, illustrating the broad vision and ready grasp of Captain Lay. He brought tens of millions of dollars into his native State, and other millions into the South, winning fairly his reputation of being one of the greatest benefactors of the age in which he served.

And while doing these things, forming contacts with great men in America and abroad and attaining riches for himself while enriching his State and the Southland, he remained one of the

most unpretentious of men, and one of the kindliest and most approachable, loved best by those who knew him best. His relations in the home are tender and beautiful, and his relation to the community has known no jarring note.

This year, 1930, he was presented with an exquisite loving cup as a token of love and appreciation by his fellow citizens, and only a few months before, he had been the honor guest of a notable gathering of Southern people at Lock 12, on the Coosa River, in celebration of the christening of the lock as "Lay Dam." At the same time, an exquisite loving cup was presented him by the citizens of Chilton County, in which Lay Dam is located, as a testimonial to the esteem in which he is held by the people among whom he was associated while the preliminary work was being done on the river improvement. He has been honored, and his praises have been sung time and time again, but he is unchanged. He still thinks in terms of others and not of self.

Captain Lay was born in Cherokee County, Ala., on the banks of the Coosa River, in 1853, the home erected by his grandfather upon locating in Alabama being the scene of his birth. In

1870 he moved with his father to Gadsden, Ala., where he still resides.

In Gadsden, Captain Lay met Miss Laura Hollingsworth, daughter of the late Major W. P. Hollingsworth, and between the two an attachment sprang up that culminated in their marriage in 1876. To them, five children were born, Earl Lay, now of Santa Monica, California; Carl Lay of Gadsden, Alabama; Tracy Lay, American Consul General at Buenos Aires; Argentina, until recently when ill health forced his retirement; Orville Lay, of Gadsden, Alabama, and Everett Lay, of Santa Monica, California.

The home life of Captain Lay was peculiarly happy. His wife possessed, to an unusual degree, the fine faculty of making the home a place in which happiness radiated and from which sprang the most exalted influences. She was an inspiration to Captain Lay during all the years that he struggled to make real the vision of a new industrial era, and to her five sons as they took up the duties and responsibilities of life. She lived to see her husband emerge triumphant in the great struggle he had waged, and to see her sons honored and successful in the communities where they lived.

In the closing months of 1929, after fifty-three years of happy wedded life, Mrs. Lay became ill, grew steadily worse and finally passed away, rich in faith and loved to an unusual degree by all who knew her.

In the early days of his residence in Gadsden Captain Lay engaged in the lumber business but even then was giving a large part of his time to community development. Through his efforts and those of the late Colonel Eugene Eaton, the first blast furnace was located in Gadsden.

In 1887, soon after the advent of electricity, Captain Lay built and owned the first electric light plant erected in Gadsden. The modern power plant now in Gadsden, owned by the Alabama Power Company, grew from the plant Captain Lay founded in 1887.

It was during this period, 1885 to 1890, that the United States Government was engaged in building Locks 1, 2 and 3 on the Coosa River, below Gadsden, and in watching the flume at Lock 2 in 1887, that Captain Lay conceived the thought of hydro-electricity in connection with long-distance transmission, the realization of which has been chronicled.

In 1888 he figured very largely in the con-

struction of the railroad from Anniston to Gadsden, which now is a part of the Louisville & Nashville system. Meanwhile he had become interested in the erection of a modern hotel at Gadsden and, with others, had built the famous Printup Hotel. He served for some time as president of the hotel company.

In 1898 Captain Lay was largely instrumental in causing the Louisville & Nashville railroad to build a connecting system between Gadsden and Oneonta, Alabama, this being the last link that was necessary to the establishment of what developed into a very important railway line.

The location of the great plant of the Gulf States Steel Company in Gadsden in 1902 was solely through the efforts of Captain Lay, as has been shown. He also built and owned a water-power plant on Big Wills Creek, near Attalla, Alabama, which supplied that city with current and pumped its waters for a number of years.

Meanwhile, though much occupied with these multitudinous activities, he was working persistently upon the task of opening the Coosa River to navigation from Rome, Georgia, to Mobile, Alabama. He organized the Coosa-Alabama Improvement Association in 1898 and has served

An expression of appreciation for the great social and economic advantages brought about in a rural county as the result of hydro-electric developments.

continuously as its president. In the promotion of river development he prepared numerous carefully matured pamphlets covering various phases of the work, these pamphlets being as follows:

The Original Coosa River Memorial.... 1899
Conservation and Improvement of our Waterways 1908
The Great Coosa-Alabama River and Valley 1911
River Problems of Alabama 1915
The Southern Superpower Zone 1922

It was in one of the above booklets, entitled "The Original Coosa River Memorial," published in 1899, that the possibilities of the water power of the Coosa-Alabama Rivers were first introduced and publicly advocated in connection with the improvement of this waterway for purposes of navigation. One of these booklets also describes the advantages to be gained through the storage of flood waters, both as an aid to navigation and to power and as a means of minimizing flood conditions.

While Captain Lay has given special attention to the development of the Coosa River, he has for many years been an active exponent of

waterway developments generally and has been associated in numerous movements looking to this end. He has for years been vice-president of the National Rivers and Harbors Congress and also is vice-president of the Mississippi Valley Association for the South Eastern Division, comprising the territory from Mobile to Apalachicola.

Captain Lay has never sought and rarely has accepted political honor of any kind, being convinced that he could serve his country best by laboring for the development of its natural resources, thereby multiplying wealth and enlarging the opportunities of the people. By following this course he has had the satisfaction of seeing materials that once were wasted transformed into physical assets worth hundreds of millions of dollars; of seeing new avenues of employment open to thousands of persons and of observing the burden of hard and exacting toil lifted from the shoulders of multitudes. And while these developments have been going forward, he has seen cities, counties and states enriched to the point where they were enabled to provide better schools for the children, better health protection

to all, and improved facilities in all the lines of governmental endeavor.

It is no source of regret to him that out of the hundreds of millions of new wealth he has created, he has not piled up colossal wealth for himself. He is in no sense acquisitive and the few millions he has taken the trouble to garner for himself never by him are contrasted to the many millions he has made for others. As with many other men of high purpose and large achievement, the joy is found in accomplishment rather than in the monetary rewards that come to those who build wisely and well.

CHAPTER XIV

MAN'S QUEST FOR POWER

In the upward struggle man learned quickly that his own physical efforts would have to be supplemented if satisfactory results were to be obtained, and there is little doubt that his ingenuity first was turned toward the development of power—the means of multiplying the productive results of human enterprise.

How this quest proceeded throughout the ages is a story as absorbing in interest as any romance yet woven in the mind of fictionist, even though many chapters are missing—lost in the shadows of long-forgotten things.

Few great steps in human progress are made from a clearly defined point. A nebulous thought arises somewhere, perhaps in several places almost simultaneously, and begins to find expression, in one form here, in another form elsewhere, and the painful process of evolution is under way. Many minds contribute thought and many hands contribute labor, and finally the

thing is done, but who shall say where and by whom and speak with certitude?

Many of the developments of the utmost importance, such as the generation of electrical energy, extend over thousands of years, and to chronicle the story of its completeness is beyond the power of man. So any work touching the origin of the use of power, and the invention of vehicles for its use, must be quite general in its references to the earlier stages of development.

But this may be said, and it is true of all ages, men have progressed in direct proportion to the power they were able to bring to bear in the multiplication of material things—food, clothing, shelter—and the freedom they enjoyed for the pursuit of things which have to do with the mind rather than the physical being.

Primitive man produced little with much labor; modern man produces much with little labor, and art and science and education and all the other agencies of civilization, have advanced step by step as man found himself released more and more from the once endless round of toil.

Not only is the history of power the history of man's evolution from drudgery to luxury, but it is a history of social revolution; of sweeping

changes in the attitude and position of man; of the triumph of mind over muscle.

The physical giant once was the mightiest figure that walked among men, but with the vast changes wrought through the multiplication of energy, the physical became subordinate to the mental—the age of intellect was introduced.

The strongest man of whom there is record is said to have been Samson, though others of greater physical powers may have existed at one time or another, for always there have been a few men of extraordinary strength. They have appeared in all ages, and in modern times records have been kept which show the prowess of some.

There was Louis Cyr who, at the museum of Austin and Stone in Boston, made a sheer lift of 4,300 pounds—truly a colossal feat; and evidence of physical prowess that would have made him ruler over many people in ancient times. But what is 4,300 pounds to a modern derrick, that great mechanical lifter that man has designed to perform such tasks? Such a derrick may lift a million pounds under the direction of a man who might not have the strength to lift a hundred with his own hands.

John Marx, another physical marvel, is said to have split a silver dime in two pieces with his fingers, but what of that? In many machine shops are blades that will sever slabs of steel a thousand times the thickness of a dime.

Horace Barre astonished observers more than once by shouldering a dumbbell weighing twelve hundred pounds and carrying it the length of a gymnasium; a remarkable feat, but go into any rail mill and see one man pick up a carload of steel rails and carry them the length of a shop. Power does it.

Attila, Apollon, the Saxon brothers, August Johnson, Sandow, Lambert and a host of others lived to perform feats of physical strength and amazed beholders, but their supreme efforts were as the breath of a child on the wings of a cyclone when compared to the strength of the machines that men evolved as they pushed their quest for freedom from grinding toil and developed more and more the intellectual powers that lifted them above the realm of physical force.

In his efforts to supplant his own comparatively feeble energies, man probably turned first to animals; domesticating the ox, the ass, the horse, the camel and the elephant. Of these the

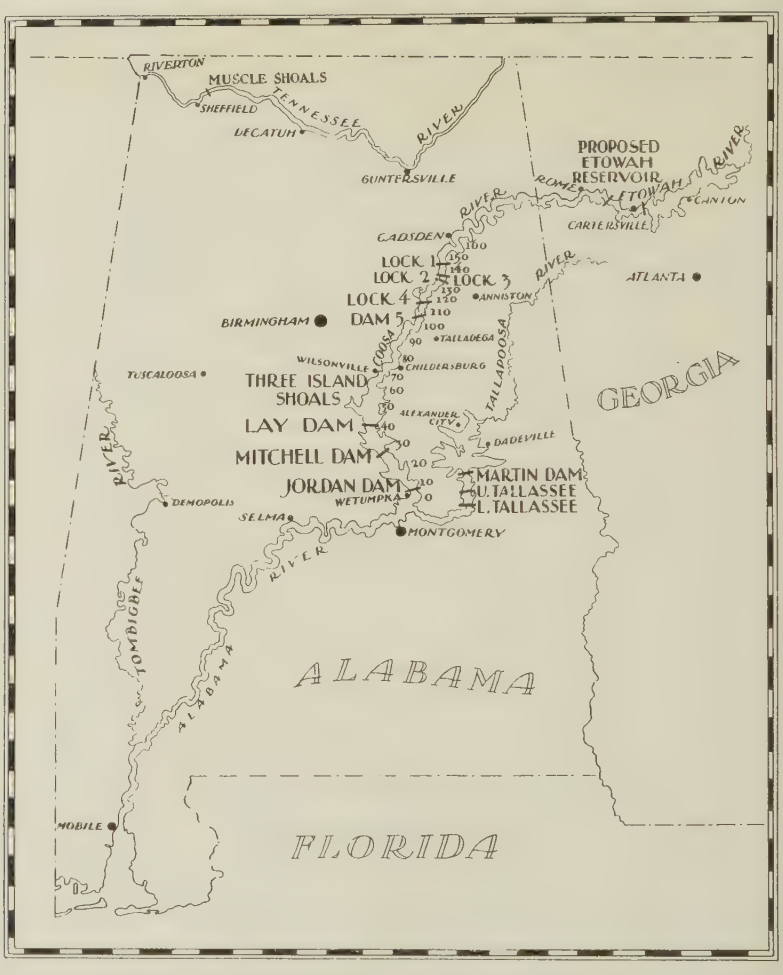
elephant was the chief tower of strength, but the greatest elephant that ever lived had not one-thousandth part the energy exerted by mechanical instruments such as push giant liners across the sea.

Struggling with their own physical limitations and the physical limitations of the animals they brought under the yoke, men began many centuries ago to achieve by mechanical means that which defied the resources of muscle, and as new sources of power developed civilization moved forward.

While the works of no primitive historian survive to tell the story, it is altogether probable that the fulcrum constituted the first discovery of an instrument by which power might be multiplied and directed into useful channels.

In the manipulation of stones, with which the cave dwelling was guarded, man discovered that by inserting a long pole beneath the edge of the stone and placing a smaller stone beneath the pole, he could easily move the heavy weight by bearing down upon the free end of the pole. That was one step.

The power of air and the power of water doubtless were discovered about the same time,



Map showing Coosa-Alabama and Tallapoosa River developments, embracing the three-fold principle of navigation, hydro-electric generation and storage of flood waters. Note storage reservoir above Martin Dam and proposed reservoirs at the headwaters of the Coosa above Rome, Ga.

but methods of application were tediously slow of development, and it could not have been otherwise.

Occasionally attempts are made today to duplicate the conditions confronting primitive man, but such duplication is impossible. Though a man seek a deserted island, naked and without tools, he still has some of the knowledge that has been gained throughout the centuries. He has behind him the precedents of ages. Primitive man had no such advantage. Without tools, without text books and without a single chart or formula, he began the struggle that led by slow and tedious steps to the achievements of today.

Food constituting the most pressing problem faced by primitive man, it is likely that one of the earliest utilizations of water power was in the grinding of grain, an operation that first was carried on by rubbing the grain between two stones by hand, as still is being done in some parts of the world—and then by substituting water power for the human hand.

The earliest form of water mill, so far as is known, consisted of the usual hollowed-out stone to receive the grain, and a pestle, fitting into the hollow, to beat the wheat from the chaff. A pole

was so rigged that one end was manipulated by water while the other, or pestle end, beat upon the grain. Since women did the grinding, this mill may be said to have marked the beginning of their emancipation—but an emancipation that did not arrive for thousands of years and, indeed, has not yet arrived for some.

The grinding of grain by hand was an ancient practice when still the Israelitish race was young, and it is recorded that they gathered manna and "beat it in the mortar." And so valuable were the instruments of grinding and so essential to the maintenance of human life, that the law prohibited one putting a mill in pawn. In Deuteronomy 24–6 this law reads, "No man shall take the nether or the upper millstones to pledge, for he taketh a man's life to pledge."

Many other references through the Bible emphasize the importance attached to the "mill" and also make clear the fact that the women contributed the power for its operation.

Nor was the condition confined to one race or land. Many centuries later, about the dawn of the sixth century, Ethelbert, King of Kent, is found making it unlawful for any person to "corrupt the King's grinding maid." Inciden-

tally, one wonders if the grinding maids were the only ones who enjoyed the king's protection! The fine for violation of this law and thus interfering with the regular flow of food to the table of the king, was twelve shillings.

The quest for power led to the water wheel many centuries ago, and its invention was a development of the utmost importance. The water wheel, manipulating the pestle and later turning one stone above the other while grinding the grain between, also found other applications in ancient times, just as it does today. It played an important part in irrigation, an art that also found birth before the advent of the historian.

Indeed, the principle involved in the water wheel has never been excelled. It is the great-grandfather of the turbine of today, recognized by all authorities as the most effective means of transmitting power. This is because the rotary motion of the wheel is continuous while the piston must pause as each stroke is completed and a new one starts.

However, the development of the water wheel solved but one problem of the ancients, and solved it only for those living where water was available. Transmission of energy from stream

to far village was a development reserved for the present century.

Human ingenuity had been at work in other directions, however, and the utilization of the power exerted by the wind was under way at a very early date. Men had learned that the wind would push a sail and that the sail would move the thing to which it was attached, and the sailing vessel had come along, and also the windmill.

For centuries the windmill played a more important part than the water mill. Its application was capable of more universal expression. It was anchored to no one spot—could, indeed, be lifted and carried about should occasion warrant, and so it came to play an enormously important part in the lives of the people—and plays such a part today, not only in the Old World but in the New.

Windmills contributed largely to the conquest of the Western portion of the United States and still are used upon a very extensive scale. But the compact wheel of the American windmill, with its multiplicity of small "slats," is in striking contrast to the mills of the ancients, as well as

those widely used in the Old World today. The picturesque mills of Holland, with their wide sails, furnish an excellent contrast.

In his inquiries into the power that might be exerted through air, early man learned that air may be compressed and its expansive force utilized. It was capable of more than pushing sails on ships or mills. Thus the development of pneumatics began. As with practically all other momentous discoveries in the world of physics, no one has the slightest idea who first observed the principle of pneumatics, but it does not require a great stretch of the imagination to picture a boy as the pioneer in this field.

Playing with the joint of bamboo, the lad discovers that a light object, such as a little ball of clay, may be blown through it and carried for a considerable distance, and soon this boy and many others are annoying teacher with what developed into the spitball of our own youthful generation.

Meanwhile adults begin to take notice—perhaps it is the teacher—and it is found that by using a close-fitting ram, an object might be hurled much farther than with the human

breath. Thus the air gun, familiar today after the passage of thousands of years, was brought into being.

But more important than the birth of the air gun was the birth of the knowledge that air might be caused to perform useful functions through compression and expansion, as well as through sheer weight. Application of the idea was tediously difficult of accomplishment but the thought persisted and as the ages unfolded the air gun was followed by the air pump, invented in 1654 by Otto Von Guericke and greatly improved by English inventors, chief among whom was Dr. Robert Boyle. Boyle became one of the world's greatest experts in pnuematics and laid down the principle which became known as the Boylan law. Hook, Hawksbee, Smeaton and many others contributed to the advance, Mariotte's supplementals to Boyle's work being of special importance. Cersted, Despretz, Dulong, Regnault, Andrews, Cailletet, Amagat, Pouillet and Faraday all contributed to the science, the works of the latter being of prime value to subsequent students of the subject.

The use of air as a carrier of messages was

adopted on a commercial basis in 1853 when Latimer Clark established a system of tubes operating between the Central and Stock Exchange in London, the pipe being 220 yards long.

Atmospheric pressure in relation to steam pumps and engines received attention very early, and in 1642 Torrielli made valuable experiments, being followed by Pascal, Descartes and others.

As a matter of course the scientists and students whose names are mentioned above did not waste their energies upon popguns. Their inquiries related to every phase of the subject of air and its uses. The air engine was brought to a fair state of development by 1816 when two brothers, Rev. and James Stirling, began producing such engines. Captain Ericsson attempted to apply the air pressure principle to engines for the propulsion of ships, but the results were not satisfactory.

Considering the enormous power delivered today from engines of small and compact form, it is interesting to note that the engine built by Ericsson for his ship experiments had four cylinders each fourteen feet in diameter.

George Cavley and Philander Shaw also

should be mentioned among those contributing useful knowledge to the advance of pneumatic applications, which culminated in the great and diverse instrumentalities of today. The science not only made possible such great engineering feats as the building of the tubes which pass under the North and East Rivers in New York, but served to speed structural undertakings of many kinds.

Every one is familiar with the ceaseless hammering that goes on as great steel structures are put together with rivets that are pounded home by pneumatic hammers. In the depth of mines similar instruments are cutting or drilling coal, and the same applies to quarries where stone and marble are procured.

In department stores tubes carry the tickets and money to the cashier and bring the change back to the customer; banking houses and other institutions apply the same principle, and underground tubes carry quantities of mail in the larger cities.

Pneumatic science made possible the long and heavy trains that speed across the country, the air brake being essential to the operation of these enormously heavy bodies, and the same thing

applies to the street car—air and electricity meeting to perform essential functions, each in its own field.

So the list might be extended almost indefinitely, all emphasizing the value of the results flowing from the patient work of investigators extending throughout the ages.

Nor is the principle of air expansion the only one touching the science that has proved of immense value in the mechanical world. Suction also plays an important part. The steel fingers that so adroitly pick up sheets of paper as they are fed into great printing presses, have tiny holes in them, and the suction, created by air, makes the feat possible. But, like the ramifications of electrical energy and the energy of steam, the uses with respect to air are so numerous that any adequate treatment would constitute a large volume in itself.

CHAPTER XV

EARLY DISCOVERIES

THE power of steam and electricity both were discovered at a very early time; so early that no record exists so far as is known, but the progress in these fields was extremely slow. There were no public libraries to which one might go and pick up sundry expositions of locomotive or dynamo building, and no night schools to which the aspiring technical engineer might turn for light. It was all a tedious process of groping into the unknown.

In this process of groping man first found a solution to the problem of how to make steam perform useful labor, accomplishing the end after many centuries of effort.

Many persons no doubt observed the expansive power of steam before the thought of utilizing it began to obtrude, for fire had been used for a very long time and steam had simmered in many an earthen vessel long before any effort was made to harness the medium. Yet the

thought found lodgment and one hundred and thirty years before the birth of Christ, Hero, of Alexandria, developed a steam engine; an engine that worked, whirling a large glass globe.

Thus the secret began to unfold, but the unfolding process was a matter of ages, since after nearly seventeen hundred years, in 1629, Giovanni Branca is found experimenting with an engine that shows no improvement. As a matter of fact, the engine of Giovanni Branca was inferior to that of Hero, though in it was a hint of the modern turbine, since he attempted to turn a wheel by directing steam against it.

Credit for making a steam engine that was successfully used in raising water, is claimed for Edward Somerset, second Marquis of Worster, but details are lacking.

An engine capable of raising water also was developed by Thomas Savery, 1698, and he may be credited with a part in starting the movement toward the patent office, which has reached such overwhelming proportions today. He utilized the vacuum principle, dating back to the engine of Hero, before the Christian era.

About the time that Savery was building his engine one bold experimenter came very near

hitting upon the internal-combustion engine by means of which automobiles and airplanes are so freely propelled today. The inventor was Jean Heautefeuill, who sought to impart useful momentum to a piston through successive explosions of gunpowder. An engine of this type actually was produced, but it appears to have been at a time when the Henry Ford of the period was not looking, so it came to naught.

But meanwhile experiments with the steam engine were going forward and in 1690 one Denis Papin developed improvements which included cylinder, piston and safety valve. His ideas were adopted in an atmosphere engine developed by Newcomon. This engine, in which steam was used merely to create a vacuum, a weight pulling in one direction and the atmospheric pressure pushing in another, proved practical and was widely used for a time. It was greatly improved by Smeaton, who built a large number of engines about 1770, but the type was shortly made obsolete by James Watt, generally regarded as the father of the steam engine as it exists today. A mechanic in Glasgow, Watt was called on to repair one of Newcomon's engines,

and he designed and patented many important improvements.

Up to this time the engine was a single-action power plant, capable of pumping and little else. By persistent experimentation, Watt finally produced an engine with a shaft and continuous driving wheel, thereby opening up a field limitless in scope and infinite in possibility.

Watt made possible the application of the steam engine to the railroad. Travathick developed this idea and built a locomotive, the "Rocket," used with success by George Stephenson upon the Atockton and Darlington railroad in 1829. This finally ended the exertions of the horse as a means of locomotion upon railways, save as it applied to local or short hauls.

Long prior to this the application of steam to vessels was a subject of extensive experimentation and a tug boat was successfully used for a short time upon the Forth and Clyde Canal in 1802 but was abandoned because of possible injury to the canal bank. This boat was built by William Symmington, who used a Watt engine with a wheel for a propeller.

Now an American came into the picture—

forerunner of a mighty army of inventors and developers in the field of mechanics, and the steamboat shortly became an established institution instead of an experiment. Robert Fulton, first attempting to operate a steamer on the Seine and failing, came to America and won eternal fame by successfully navigating the Hudson River. He made the steam-propelled vessel a practical success and sealed the doom of the windjammer while opening new worlds to the crusaders of commerce. He made 1807 a year that stands out in the annals of human progress.

While the pursuit of the power that may be derived from steam was going forward, the quest for the elusive energy of electricity also was under way, but the halter had not yet been slipped about the neck nor the harness applied. Even so, the race began centuries earlier.

The identity of the person who first learned that in nature there is a subtle force as invisible as the wind, is wrapped in the unfathomable things of the past, but certainly the fact that electric force existed was known thousands of years ago, and then it was just as capable of turning a dynamo or filling the loud-speaker with static, as it is today.

Attention to the existence of this force first was attracted, no doubt, by the fact that some elements have the property of becoming magnetic when rubbed, scores of familiar materials exercising this magnetic quality when friction is applied. Thales, of Miletus, is said to have commented on this phenomenon six hundred years before the dawn of the Christian era. Reference was made to it by Theoprastus in 321 B. C., and by Pliny in 70 A. D. The latter made reference to the power of amber to attract light objects when the amber was rubbed.

Thus electrical energy had attracted attention centuries before the record shows any attempt had been made to utilize steam as an agency for power development, but practically nothing had been done toward controlling or directing it. However, inquiring minds continued to delve into the subject and something of the truth began to dawn with the coming of the fifteenth century.

About this time Dr. Gilbert, of Colchester, began systematic experiments to determine what material possessed, or could be made to possess, the peculiar property of magnetic attraction, and he compiled an extensive list.

During the following century Robert Boyle

took up the work and developed numerous facts that proved of service to subsequent investigators. Early in the sixteenth century Otto Von Guericke anticipated in some degree the amazing developments of the twentieth century by producing an electric light; lacking the brilliancy of the globe later brought into being by Edison, but a light, nevertheless. His light consisted of a ball of sulphur in a glass globe, the illumination being created by brisk friction with the hands upon the glass.

These experiments led to others and in the following century Sir Isaac Newton became interested in the subject and performed some experiments that were of value. He used a glass globe without sulphur or other elements, and found that by rubbing the globe it could be made to agitate bits of paper, causing them to leap from one part of the globe to another.

Thus the work of experimentation went forward from century to century, a bit of knowledge being found here and another there until 1729 when Stephen Gray, Fellow of the Royal Society, discovered that electricity might be conveyed from one object to another by means of a string; that it was capable of being conducted.

From a painting by John C. Johansen.

JAMES MITCHELL,

Who succeeded Captain Lay as president of the Alabama Power Company and financed many of the early operations.

He succeeded in carrying the current for a distance of 886 feet. Following these demonstrations, M. Dufay, an Englishman, a member of the Academy of Science, repeated the experiments of Gray and succeeded in conducting the current for a distance of 1,256 feet. These results also were obtained with a glass ball—forerunner of the modern generator.

German and Dutch philosophers now took up the chase and Professor Winkler, of Leipsic, added a "brush" to the "dynamo," substituting a cushion with which to cause friction upon the glass. Then, as the fever of conquest spread among scientists, a discovery of the greatest importance was made by a group of men who, while experimenting at Leyden about 1745, discovered that electricity not only could be conveyed but that it could be stored. The outcome was the "Leyden Jar"—the original storage battery through the development of which it became possible for the motorist to start his engine. But between the Leyden jar and the modern storage battery was a gap of more than a century.

Following this, some progress was made in the direction of long-distance transmission—

halting, of course, but progress just the same. A party of scientists headed by Sir William Watson, of the Royal Society, succeeded in conveying electricity over a circuit in excess of 12,000 feet, discovering that the velocity of the current was instantaneous. A great number of experiments were made under the direction of this body, which gave immense impetus to the work of investigation.

Early in the past century America entered the field of experimentation with Dr. Benjamin Franklin, of Philadelphia, as the chief mentor. He conducted exhaustive experiments with the Leyden jar and made valuable contributions to the quest for power and light. His experiments with the kite are known to every schoolboy. He declared that electricity had its counterpart in lightning. He found that electricity in clouds was positive at some times, negative at others, thus establishing the theory that it possessed two distinct qualities.

About the time Franklin was writing of his experiments and setting forth his conclusions, the first known martyr to the new power was found in Professor Richman, of St. Petersburg, who also was experimenting with thunderclouds. He

erected an iron rod in 1753, with a view to collecting the electrical discharge, and was killed when a bolt, described by a companion, Sokolow, as "a globe of bluish fire," leaped from the rod to the head of the professor, killing him instantly and severely shocking Sokolow.

About the same time an Englishman, John Canton, made important discoveries relative to positive and negative electricity, and an Italian contemporary, Beccari, also made valuable contributions to the growing knowledge. By now the hunt had become practically world-wide and was extending in almost every conceivable direction. Metals, stones and fabrics of all kinds were experimented with, and fish and animals were brought under the gaze of the eager students.

In 1790 Galvani made discoveries which led to the recognition of a new form of electricity which became known as Galvanic or Voltaic Electricity—known as frictional electricity. Henry Cavendish made experiments of a chemical nature that were of value, and early in the following century Coulomb made experiments which resulted, among other contributions, in the invention of the torsion balance, which

proved particularly applicable in the measurement of electrical action.

By the first of the year 1800 experiments had become so numerous and the field of research so widespread—and the results so multitudinous—that it would require volumes to record even a portion of the whole, and progress toward practical results, rather than interesting experiments, began.

A suggestion of the motor appeared in the experiments of Professor H. C. Oersted, of Copenhagen, who in 1820, discovered that the current of a galvanic battery, when passed through a platinum wire, acted upon a compass needle placed beneath the wire. The avenue this discovery indicated was followed by a French discoverer, Ampère, who learned of the ponderomotive action of one current upon another—thus opening a new avenue into the field of electrodynamical action. His work was of the highest importance, experiments being followed by mathematical discoveries of great value. His was by far the greatest advance that had been achieved in the centuries of inquiry and experimentation, and were followed quickly by other results of vast significance.

In 1821 Faraday discovered electromagnetic rotation, causing a horizontal wire carrying a current to rotate across the vertical lines of a field of magnetic force, and thus anticipating the electric motor of today. His experiments, extending over many years, were of incalculable value.

From now on the quest became more insistent; scientists, philosophers, mathematicians and students delving into all phases of the subject, and the whole culminating with the works of such modern men of genius as Morse, Bell, Edison, Marconi, Steinmetz and others, and in the amazing examples of the power of electricity that was seen on every hand.

Yet, as showing how slow was the process, it may be recalled that there was something like twenty-five hundred years between the amber magnet and the Leyden jar, and two hundred fifty years between the Leyden jar and the machine to kick the auto engine into action.

But the centuries absorbed in experimentation before electricity was converted into a useful servant, constituted no index of the pace at which practical application would be made once the age-old force was brought definitely under

control. There is nothing in history more dazzling than the era of electricity introduced about the dawn of the present century. The pace of the snail gave way to the speed of the lightning; that which was static became positive, and events of which men had dreamed and events of which no man had dared conceive, became commonplace.

Electricity, that force which had eluded the quest of ages, suddenly was fitted with a yoke, and bent to the purposes of man, and no magic lamp of fancy ever produced one-half so many marvels, nor caused one-thousandth part so great a revolution. The earth that had been some twenty-five thousand miles in circumference, became a second in circumference, and men upon the other side of the earth came to stand as close as the nearest telephone. Distance lost its meaning and isolation ceased to be. And, what is equally significant, toil was lifted from shoulders to machines as never before in the history of the world.

The names of thousands of Soldiers of Progress, whose contributions made possible the amazing developments of the present, are lost; the names of other thousands are known only to students, but their work lives in a multiplicity of forms and constitutes an heritage beyond

all price. By their quiet, persistent labors, extending through the ages, they achieved victories by means of which the human family was led into the blessed privileges and enjoyments of today. A mighty host of material and social benefactors, they deserve a higher place in the thoughts of the people than has been accorded them.

CHAPTER XVI

A SOLDIER'S REWARD

AT a spot on the Coosa River, twelve miles from the nearest railroad, some five thousand people gathered upon a cold and rainy day in November, 1929, the number including some of the most outstanding figures in the electrical world. Bands played, flags rippled in the wind and a dirigible rode overhead, dropping low in salute, while the throngs gathered about the speakers' stand and movie cameramen rushed here and there. It was a notable occasion in Alabama, the purpose being to dedicate the great plant at Lock 12 as "Lay Dam" in honor of the man who had won distinction as a "Soldier of Progress."

As the ceremonies went forward the roaring river rushed on, hurrying through the great turbines at Lay Dam that it might turn other turbines at Mitchell Dam and still others at Jordan Dam, generating the while a total of 450,000 of horse power. And as these mighty enterprises sent their energy through slender wires to far places, two other great plants on a

tributary—the Tallapoosa—were turning likewise, while a third was being rushed to completion. Six great units, the existence of which was due to the man who was this day being honored. Not only so, but throughout the whole Southeast other plants that had grown out of the Lay conception were equally busy, the whole representing an aggregate in energy far greater than could have been exerted by ten times the number of slaves that these States had lost when the principle of human freedom was established in this country.

It was an inspiring scene, fittingly reflecting the inspiring accomplishments behind it.

The chief speaker of the occasion was M. S. Sloan, President of the National Electric Light Association and of the New York Edison Company, who quoted figures showing that wages had increased $350,000,000 in Alabama following the introduction of hydro-electric energy. Thomas W. Martin, President of the Alabama Power Company, which Captain Lay had organized and first served as president, also spoke, and an address in behalf of the Governor of Alabama was delivered by Woolsey Finnell, Chairman of the State Highway Commission.

The formal addresses of these gentlemen were followed by an unexpected speech from Judge L. H. Reynolds, of Chilton County, in which Lay Dam is situated. In this speech a new note was struck when Judge Reynolds told of the great social benefits that had followed the introduction of this industry in the county, and in conclusion presented Captain Lay with a beautiful loving cup in behalf of the men, women and children of Chilton County.

The address of Thomas W. Martin, who presided, was as follows:

"We are gathered today to honor one of the pioneers of Alabama's present-day development. Out of the past there comes the story of one who for a lifetime had a vision for the development of his native state along lines which looked to the control and use of the water powers of the state—a pursuit to which the spirit of the times strongly invited him. In the period of 30 years ago, when our fellow citizen was beginning his public effort to improve navigation on the Coosa River by building dams which would serve the dual interests of navigation and power, few there were who had faith in his plan. It is proper on such an occasion as this that the record lead-

ing to this achievement should recite some of the events which are now historical, and thus give to the pioneer the place in history to which he is entitled.

"As we glance in retrospect, we find that William Patrick Lay played his part in one of the most fascinating, inspiring and interesting movements of the country, and by the foresight of himself and a small group of his Alabama associates enabled his native section to assume a place of vast importance in the South and in the nation. Numerous efforts were made in the nineties to create an interest in the improvement of the Coosa River, and finally a few citizens of the state met in 1899 at the call of Captain Lay and organized the Coosa River Improvement Association. A convention soon after assembled at Gadsden and adopted a memorial to Congress asking an appropriation of a sufficient sum of money to remove the obstruction which intercepted the navigation of the Coosa River. In support of the memorial, Captain Lay, the president of the association, whom we are honoring today, concluded with suitable reference to the beauty and grandeur of the Coosa Valley—its fertile fields and its great deposits of coal and iron, and its water powers which would thus be created, so that when completed,

the Coosa Valley will be second to no spot on earth.

"Definite support was given this effort, not only by the representatives in Congress from Alabama, but by Senator Morgan, who, in an address to the association, approved the project and expressed his purpose of working with other citizens of the state to accomplish the great ends in view. 'No argument,' said Senator Morgan, 'is now needed to commend this work to the consideration of Congress as a proper work of river improvement.

"In due time, the government engineers were authorized by Congress to again survey the Coosa-Alabama River system and report upon the commercial value which would result from its improvement and upon the water-power possibilities. Colonel Ferguson submitted a complete plan for the full development of the entire river system. High-lift locks and dams and fewer of them were provided for, to carry the navigation over the rapids of the Coosa and at the same time conserve the water-power possibilities. Storage reservoirs at the headwaters of the Coosa and on the Tallapoosa were also recommended. It was the hope that private capital could be induced to build the power dams and

thus relieve the government of a large portion of the cost.

"The Ferguson plan, as it came to be known, was the pioneer effort to bring forward a complete and comprehensive policy for the full development of an entire river system for the improvement of navigation, the development of power and the control of flood waters. The engineering mind was more and more considering the building of high dams across just such streams as the Coosa and Mr. Lay and his associates determined to interest private capital in the work.

"To accomplish this, Mr. Lay organized the Alabama Power Company under the laws of Alabama on December 4, 1906, in his home city of Gadsden, with a nominal capital stock, and was its first president. He enlisted the friendly interest of the late congressman from the district, the Hon. John L. Burnett, in the effort to have Congress authorize the building of a dam at the Lock 12 site. Mr. Burnett, with a far vision which characterized his public acts, introduced the bill and it was passed by the Congress and approved by President Roosevelt on March 4, 1907.

"Surveys and plans were made for the pro-

posed development by eminent engineers, including Col. Hugh L. Cooper. With insufficient capital, but with faith, hope and confidence in his plan, Mr. Lay actually began the construction of the project in 1910, continuing his efforts to interest capital in the project. 'I found myself,' said Captain Lay in after years, 'facing the greatest problem of the entire undertaking, and this was to finance the project. I started out with a choice as to where I might have to get the money, and this choice was: First, in Alabama; second, the South; third, the United States, and fourth, anywhere. In my work, my finances became so exhausted that I got some friends in with me who spent several years in this work in New York and other parts of the country, and meanwhile I journeyed North, East, South and West, presenting my plans to anyone who would give me the opportunity—but with no success. I finally succeeded in getting in touch with Mr. James Mitchell, a citizen of Massachusett, whose experience and connection with English banking houses enabled him to form a plan of development and financing the Alabama Power Company as it stands today.' He then resigned the presidency and was succeeded by Mr. Mitchell, who continued as the

executive head of the company until his death in 1920.

"The Lock 12 project of 110,000 horsepower was completed in 1914, and was the first development in Alabama combining river improvement with power development. It has since rendered a continuous service to the public, supplying a large part of the ever-increasing demand for electric energy for the remarkable growth of the state during the past 15 years.

"To obtain a better conception of the size of the Lock 12 plant, one needs only to realize that it will furnish sufficient power to light one and a half million of the standard 60-watt lamps used in our homes. This number of lamps spaced fifty feet apart, would extend half way around the globe. This amount of electric energy is sufficient to light more than 55,000 average homes with all the lights in each house burning simultaneously.

"The significance of power development in Alabama at the period of 1912 was profound. The entire state was using about one-fifth of the estimated annual output of the Lock 12 plant. Others joined Mr. Lay, or separately became interested in developing the water powers of the Coosa River, including Messrs. O. R. Hood, Hohenberg, Lull, Schuler, Horne, Carling, Jackson,

Wadsworth, Solomon and Norcross. Scarcely could it be appreciated when work was going forward at Lock 12 that a single development with so vast a volume of power would be readily absorbed in the state, and yet it is of peculiar interest that Mr. Lay and his associates brought into their plan of 1912 a number of other undeveloped power possibilities which were embraced in the Ferguson plan. These included the site immediately below Lock 12 on which Mitchell Dam was erected and placed in service in 1923; the Jordan Dam but recently erected immediately below Mitchell, and the Martin Dam later erected in accordance with the Ferguson plan at the Cherokee Bluffs site on the Tallapoosa River, and two other developments down-stream on the Tallapoosa, making a total of six great power dams which in the period since 1912 have been erected by the Alabama Power Company and placed in the service of the public of this state, with an ultimate capacity of over a million horse power. In addition, large reserve steam plants have been erected in the coal fields as a part of the system to further insure the service to the public.

"As each plant came into existence, it was connected with other plants which enabled large central station operation, bringing to the several communities throughout the state an unlimited

THOMAS W. MARTIN,

Who became president of the Alabama Power Company and carried on the works of development following the death of James Mitchell. Mr. Martin also is president of the Commonwealth and Southern Power Co.

power supply for their industrial and lighting needs. Operating skill and genius have been developed to meet the problems involved in this enlarged state-wide operation, because its success depends upon complete coordination. As this great system has been developed, it has become more efficient, for we have used greater amounts of energy from each plant due to increased demands, improved technique in operating methods, other developments operating in step with this plant, and interconnections with plants in neighboring states, and the mass production and distribution of energy has resulted in economies which have enabled the company to make rate reductions and to extend the service into every section of the state. Rural service has become one of the company's chief aims and is making the waste places bloom and is improving living and working conditions of farms. It is worthy of note that if the domestic rates in effect throughout Alabama in 1914 were still in operation, the cost of such service to the people of Alabama would be three times what it is today.

"The Coosa River dams have been erected by this company in accordance with a comprehensive policy adopted both by the State and Federal governments for the improvement of navigation, the development of power and flood

control. Slack water pools were thus formed covering a distance of 65 miles over the worst of the rapids. Government engineers are now working on a plan to complete the project, and this company stands ready to co-operate with the government to the fullest extent possible, to the end of making this river an artery of commerce from Rome to the Gulf.

"Before the coming of the pioneers, the wasting waters of the Coosa River went their way to the sea. It was realized that the immense power of this stream could only be a utility for the service of man when properly controlled. These pioneers had the vision to perceive what would follow the era of hydro-electric development and the ability to press through the single opportunity to finance the project that opened to them. While rewards have come to Mr. Lay and his associates, far beyond any individual profit runs the spreading benefit to the people of this state at large. Through means of power development, thousands of people have been given employment in almost every form of industry; the sum of human comforts and conveniences has been increased; there has come from the application of power to daily tasks in shops and factories and homes more leisure to those who work, and especially to the women and children. We have seen that this hith-

erto agricultural section of the South has been given the means and the methods to quicken and expand the aspirations of thousands of its citizens, a result of making a new business grow where none existed before, and these are results worth more than all the pecuniary gains.

"During the period since the Lock 12 plant was completed, the development and distribution of power has been the basis for steadily increasing industrial activity, which has been reflected in a substantial increase in population and in wealth of the state. During this period the connected load of the company has increased from 47,000 horse power to 989,755 horse power, and the output of power from 20,000,000 kilowatt hours to 2,095,000,000 kilowatt hours, and it is of special significance to note that in the same period the value of manufactured and mineral products of the state has increased from $169,000,000 to $800,000,000 and the annual pay rolls from $50,000,000 to $300,000,000.

"The directors of the company considered that suitable recognition should be accorded Captain Lay for his successful efforts. In order that it may have historic significance, this expression on the part of the company takes the form of giving to the Lock 12 development Captain Lay's name; but in a larger sense it might well be said that this

plant will stand as a monument to private initiative and personal sacrifice, those foundations upon which American civilization has been built. Without that initiative and personal sacrifice and enterprise, the electric industry would never have reached its present state of usefulness.

"We are paying tribute to a fellow citizen today who had the foresight to pioneer in the field of electric development, and thus we are not only recognizing his achievement, but we are holding up an inspiring example for those who come in future to do the work of the world.

"Perhaps we may be permitted to paraphrase the words of former President Coolidge when he pinned upon Mr. Edison's lapel a congressional medal of honor: 'Noble, kindly servant of Alabama, and benefactor of her people, may you long be spared to continue your work and to inspire those who will carry forward your torch.' "

Mr. Matthew S. Sloan then was introduced, and he spoke as follows:

It is to my mind singularly fitting that this dam and power plant at Lock 12 should bear the name of Capt. W. P. Lay. This was the beginning of hydro-electric development in Alabama. Captain Lay is the man, more than any other,

who made that possible. It is, I say, singularly fitting that there should be paid to him the honor of calling this pioneer undertaking by his name, so that it may stand down through the years as a memorial to the man and his work. I am happy and proud to be able to participate in this tribute to him.

"We take great satisfaction in the scientific, commercial, industrial progress of our age. We are proud of its achievements and what they yield in better working conditions, higher standards of living, a happier lot of humankind. We are prone, it seems to me, to overlook the fact that each advance is due in its beginning to the efforts of some one individual—some person who had the vision to see the possibilities and the ability to bring them into accomplishment. Enjoying the advantages, we are only too likely to forget how we got them. Happily, that is not true in this instance. It is heartening to see that Alabama, the center of a water-power development of vast industrial importance, has not lost sight of the part played in this development by one of the pioneers.

"Captain Lay's work in organizing the Alabama Power Company and contributing to the successful financing and building of this dam and plant brought about a new era in the history

of this state. Water power development has proceeded until it has become one of the great industries of the state. Not only is it that. It has become a key industry on which other industries are based because it makes their operations possible. Consider this one development under our eyes. This dam, on which the power company has spent more than the total sum expended by the federal government up to date on the Coosa River, creates a slack water pool some 25 miles in length. This is navigable, and by reason of that fact important commerce has been built up in lumber and lumber products, therefore without transportation facilities to markets.

"During the past 17 years statistics show an increase in the volume of manufactured and mineral products in this state from $169,000,000 to $800,000,000. They show an increase in annual payrolls of $50,000,000 to $400,000,000. Since these increases occurred during a period when the power output of this company was vastly increasing, there is an obvious connection between the supply of power and the growth of the state's population and wealth.

"Water-power development has proceeded and spread out so that it now covers practically the entire state, serving its cities, towns and rural

areas. It utilizes natural resources, which had been running to waste. It takes nothing from the state. It uses up nothing. It is saving or releasing for other uses coal, each year running to the aggregate of millions of tons. It has put to work in the state millions of dollars in capital. It has created a business which gives employment to hundreds of people who have their homes and spend their wages here. It enables other business to locate here and put more money into circulation. Thus it seems to me it is a striking example of the way in which legitimate business, seeking its own growth and prosperity, becomes of great general benefit to other business and the public at large.

"The power and light industry is especially happily situated in that respect. It is a public utility, that is, a business defined under the laws as affected with a public interest. It grows as it supplies a service useful to the public, and it can only grow as its service is used because it is found useful, desirable, above other agencies which might be put to work.

"We have excellent illustration of that fact in certain figures of industrial growth in Alabama and her neighboring Southern states. We all know the South has experienced a large and healthy development in recent years. Factories

have moved from Northern states to take advantage of conditions found in this section of the country. Branch factories have been established in the South in centers of distribution. They use Southern materials. They employ local workers. They spend large sums locally for wages and supplies, thus contributing to the prosperity of local business and agriculture. We all know this, but I wonder if you know on what a large scale it has been taking place. I didn't until I saw statistics on it.

"In the seven states of Alabama, Florida, Georgia, Mississippi, North and South Carolina, Tennessee, the number of wage earners in industry increased from 569,000 to more than 800,000 during the period from 1914 through 1927. That was an increase of 43 percent against a 19 percent increase for the entire country. During that same period payrolls rose from $219,000,000 to $645,000,000.

"That is an increase of 195 percent compared with an increase of 163 percent for the whole country. The value of manufactured goods increased to nearly $4,000,000,000, which represented a growth of 201 percent compared with a growth of 159 percent in that period for the entire country, and the value of mines and quarried products increased to more than $100,-

000,000, or 95 percent. The value of property increased 115 percent, while population increased 20 percent. In the same period the electricity supplied by the public utilities increased 706 percent as compared with 455 percent for the entire country. Thus we have the power industry growing right along with communities and businesses it serves, prospering with them, used by them because useful to them, its development both a cause and an effect of their development.

"That is the case all over the country. It is generally conceded by economists that the power industry is one of the basic elements in the rise of our nation to industrial supremacy. That supremacy has grown up out of mass production and the large scale merchandising accompanying it. Mass production, which has raised standards of products and lowered production costs, would not have been possible without newer and better types of machinery which have come into existence because large supplies of low priced electric power were available.

"Our progress and prosperity have not been confined to business as such. They have affected the individual and have benefited him. Coincident with our great industrial development has come a notable improvement in our standards of

living, which are a marvel and an example to other nations.

"More than any other nation, we have adopted the policy of paying wages in accordance with output. The individual whose productive capacity has been multiplied by electrically powered machinery gets his reward in a fatter pay envelope. Accordingly, he has been able to spend more for goods and services and his purchasing power has been increased because of the lower prices made possible by mass production and mass merchandising. Out of this has come the well-fed, well-clothed, well-housed American family, with which we are familiar, owning its own car, or maybe two cars; a good radio receiving set, and many other articles of luxury out of the reach of the average family of past generations. For all of this the power and light industry can claim at least a part of the credit since it is one of the basic elements in the situation.

"Henry Ford recently made a striking statement about electricity. He predicted a vast increase in its use in the next decade, continuing until it is used generously and for purposes to which it is suited in homes, work places, or farms. He said electricity should be made so low in price that it would be cheaper to use it than

not, and he looked forward to a day when one great organization would serve the electric needs of the entire country. He said he was not afraid of any power trust. The one great organization would have such advantages in efficiency and economy and unfailing supplies of power that the benefits to the country would far outweigh any profits which might be taken through it.

"Mr. Ford is perhaps a few steps ahead of us of the electric industry. We believe with him that the future will show a great general use of electricity. We know that is coming year by year, and we know what it will represent in drudgery saved wherever people substitute electric power for muscle power.

"We are working just as much as we can in accordance with sound business principles to sell electricity at lower prices so that it will be cheaper to use it than not to use it. Whether, in time, the electricity supply of the country will come from one great organization we don't know any more than you do. We do know that the history of electric utilities has been one of development into larger and larger units so that some of them, like yours here, serve practically a whole state, and there are groups of companies combined into systems which cover a large part of several states.

"Such integration of small companies into large ones and of large ones into great system is one of the ways—a very important way—by which the costs of administration and operation have been lowered so that prices could be lowered. It has been a natural, logical process and undoubtedly will continue so far as it proves good economics. The usefulness of the electric industry to the country must be increased by means of better organization, larger power developments as demands increase, and lower prices whenever possible. These items are the business duty of the power industry and are required by its obligation to the public it serves.

"The industry has created a splendid record in its comparatively brief life. Nearly 70 percent of the homes of the country have electric service. Factories, 50 percent of them, draw their power from the generating plants of the industry. It has been estimated that half a million farms in this country are electrified. Those of you who have electrified your farms, as the lines of your own company have gridironed the rural districts, realize what that means in better living conditions in the farm houses and labor saved in all chores. I consider it one of the great duties of the power industry during coming years to electrify the American farm and the

American home as completely as American industry has been electrified.

"Year by year, as the business of the power companies has increased, rates have been lowered until the average price paid for household electricity the country over is now considerably less than it was before the World War. These reductions in price in recent years have taken place, please remember, while other items in the cost of living have been much higher than before the war.

"So we of the power industry believe a good record has been constructed. We believe this record has been constructed because the power companies have put into this job vision, courage, zeal and a devotion to public service. I know they will continue to do so because they have ideals and recognize their duty to the public they serve. Because this is so, they will use in fullest measure their scientific resources and administrative skill to make service better, more useful in all applications, used by more people. They will share with their consumers every advantage they obtain from increased efficiency and economy, selling more electricity for less money. They will carry on their business on a high ethical plane, having an eye to the public welfare which the business serves. They will operate as

sound business concerns, seeking growth of sales and profit but only because they earn them. They will seek public approval of policies and performances, but expect it only as they deserve it. The power industry can earn profits and deserve public approval only by serving acceptably as a business and satisfactorily as an industry affected with a public interest. This I am confident it will do. As it does so, it will contribute more and more to the prosperity of industry as your company here has done, to the promotion of commerce, to better conditions in the homes, to higher standards of living.

"It has been a great pleasure for me to be with you today. Thank you."

Replying to these addresses, Captain Lay said:

"If hope deferred maketh the heart sick, and I can testify from abundant experience that it does, hope fulfilled maketh the heart exceedingly glad, and surely I can testify to that on this happy, happy day for me. It has always seemed to me that the greatest satisfaction that could come to any one was in the knowledge that what he had tried to do and what he had done met the commendation of those whose opinion he valued and whose approval he desired.

"The gracious, thoughtful and considerate action of Alabama Power Company in naming this dam for me touched me most profoundly. What has been said about me here today, this great outpouring of my friends and fellow citizens, and the expressions of commendation which have greeted me on every hand, have continued to uplift my spirit until I find it difficult to voice my thanks and appreciation of the honors heaped upon me. Every friendly word and gesture stirs a wave of gratitude from the depths of my being, but I believe I would be unworthy of them all if back of my purely personal feeling of satisfaction and joy was not a deep and abiding thought that those expressions are not only ones of appreciation of my vision and labors but also of the development which they helped to bring to pass.

"This dam, had it been erected merely to honor me and bear my name, would mean very little to any one save a few of my personal friends and loved ones. It means what it does, and this great crowd here, and these ceremonies are proceeding because it reaches far beyond all personalities and embodies and projects the idea of progress and service; because it typifies that spirit which makes America great—the guiding of the forces of nature to the uses of man and the

releasing of man from heavy burdens of toil that his spiritual and cultural nature may grow and expand. In this spirit, Mr. Martin, my heart responds to this great honor which the company bestows upon me.

"I would be untrue to myself, untrue to the memories that throng my mind and heart at this hour and unworthy of the honor done me, if I did not hasten to ask, what I know you will gladly give, and that is recognition of other personalities and other forces that entered into this work. It is an old saying that no man lives to himself and no man dies to himself. I believe it equally true that no man does his best work alone, no man reaches worthwhile success without the help and assistance, inspirational as well as physical, of others who sustain him by faith and confidence as well as assist with money and brains. I would not be here today, this great development would not be here in its present form and with its present history, if during the long years of struggle between its inception and its certainty my hands and heart had not been so sustained. Some of them are here present, some are in far parts of the world, some I am sure are looking upon this scene from the mansions of the blessed and communing with us in spirit here today.

MATTHEW S. SLOAN,

President of the New York Edison Company and of the American Electric Light Association; a native of Alabama.

"As memory tracks back through the years and as I gaze upon this scene, and as I visualize the two great dams below this one on the Coosa, and the three great dams upon the Tallapoosa and the great steam plants at Gadsden and Gorgas and the transmission lines striding over the hills and valleys of Alabama carrying light and power and comfort and wealth and industry to the people, I feel again the amazement that swept my youthful mind when I learned and realized that 'tall oaks from little acorns grow.' Great as my dream and vision seemed to me in those days, it now appears but a small acorn in the contemplation of this tall oak which under the nurture of faithful and skillful hands has grown to such proportion.

"Fortunate indeed was the holder of this acorn of such potentialities, fortunate the electric industry and fortunate the people of Alabama when after a search beginning here at home and extending in widening circles until it crossed the Atlantic Ocean, at last those honest, capable and clean hands were found and this seed of promise safely placed within their vigorous grasp. It can be said with truth and verity that the search had been conducted in all honor and I steadfastly affirm that the trust then imposed has been most honorably discharged and point to the history,

the success, the present fine service of the Alabama Power Company as indisputable evidence of the fact.

"Never can I forget the occasion and the hour which marked the turning toward success of this enterprise. We had the project under option to a New York company and the negotiations had reached such a point we felt sure of a trade. However, we had reached this point so often before and then had our hopes shattered by a sudden explosion, that I had previously reached a tentative understanding with Mr. James Mitchell that in such an event he and his associates would come to our rescue. Sure enough, when the hour came to close on February 1, 1912, the usual explosion happened and the New York company did not exercise its option. In all honor to that great spirit, James Mitchell, true and dependable then as he was in all his engagements, be it said that within an hour he was on the job. The guidance of the Alabama Power Company thus passed from my hands to his. He had even then associated with him Thomas W. Martin, who was in turn to receive from his hands the trust when untimely death caused him to cease from his labors. You may imagine something of my relief and satisfaction when Mr. Mitchell, representing himself and clean, high-

minded English and Canadian capitalists, thus came to our rescue, enabling the great development to proceed until in the course of time American capital could carry it on, and it could come largely under the guidance and control of Alabamians.

"My studies and investigations, in early life, led me to the definite conclusion that raw material, energy and transportation were the three principal factors in all industrial progress and that if they were properly co-ordinated in the Coosa Valley progress would be swift and far reaching. Standing here today I believe I am justified in saying this conclusion has been proved by what has been done and the bright promises of the immediate future. Alabama Power Company speedily built up a splendid organization with which it has been an honor and a pleasure to be associated. Its able and far-sighted executives, its skilled and loyal force of employees, have proceeded steadily with such development and coordination. By building their great dams they have ameliorated flood conditions and lightened the burden of the government so that it can go on and do its full part in the development of the stream to its fullest possibilities. They have enabled raw material to be fabricated, giving employment to our people,

have brought them home comforts and have thus helped provide markets for farm products.

"This work has not been accomplished without opposition, even as I encountered it in my pioneer days. It seems the fate of all new and far-reaching innovations, especially those dealing with the forces of nature, to encounter the hostility of men who will not catch the vision and march with progress. Sometimes the greatest obstructionists are those who receive the greater part of the benefit, but it is well for mankind that they cannot have their way and that for their own and common good they are brushed aside as the world moves on.

"I am glad to say from an appreciative and grateful heart that I never met such opposition from the people of Chilton County, where I did so much preliminary work. On the contrary, they assisted me and met me with warm hospitality. While some expressed doubt as to the feasibility of the project they were always ready to help me when possible. I see many of them before me now and I rejoice in the progress and prosperity that is being exhibited by this splendid county.

"I would be unworthy of the small part Providence has allowed me to play in this great unfolding drama of flood control, of unob-

structed navigation, of hydro-electric generation, if I were content in the short span of time still allowed me to stand still and revel in dreams of the past and merely invite you to share such pleasure with me. Rather would I feel and say to you:

" 'Some work of nobler note may yet be done.' The future still beckons with alluring promises and the end of man's achievements in the direction in which we are moving cannot be discerned. As its vista opens before our expectant eyes I leave with you the question of the prophet of old:

" 'How long shall it be to the end of these wonders?'

"Mr. Martin, and my associates in the Alabama Power Company, friends and citizens, one and all, I thank you."

At the conclusion of the address of Captain Lay, Judge Reynolds was introduced and he presented the loving cup following a brief address in which he said:

"As a representive of the people of Chilton County, who in a way are hosts upon this occasion, permit me to say for them that we are extremely gratified in having you as our guest. It

is one of the biggest honors ever bestowed upon us, and I trust that each of you has enjoyed your visit and I assure you that the welcome sign shall always be hung up for your return.

"About twenty years ago the Alabama Power Company first began its operations in Chilton County, and today we have as a result two magnificent structures, this one now being officially known as Lay Dam, and the other, Mitchell Dam. The spirit and co-operation existing between the people of Chilton County and the Alabama Power Company and its officials has always been the very best, in all this period of time no controversies or strife have ever existed between us, but always the spirit of co-operation for the betterment of the people of our County. This Company and its people have been a great benefit to us, both in a material and a social way.

"Before the name of the Alabama Power Company had been heard, appeared a man in our midst, small of stature, but sturdy of mind and perseverance, who came here for a purpose no one knew and no one thought much about. The road you have traveled from Clanton to this site today was many times walked by this man upon foot before the days of automobiles and with his instruments he was testing rocks, observing and surveying up and down the banks

of this river, which then was a great body of unharnessed energy rushing on in its wild furor, serving no purpose except a few fishermen who dotted its shores here and there. Wild rumors were afloat in those days, regarding this man's purpose, some of the old natives said he was looking for gold, and rumor had that the Indians had buried a box of gold and that this stranger had a map which would lead him to the hidden treasure. When the stranger made known his purpose, that he was contemplating building a dam across this river, the people shook their heads in disbelief and said it could not be done, but the idea in this man's head fostered by his untiring perseverance, resulted in what you behold today.

"To this pioneer and leader, the Alabama Power Company has paid its tribute so justly due, but Chilton County and its officials were unwilling that the opportunity should pass without it also, in its humble way, likewise paying its tribute of respect and honor to the man whom we many years ago learned to love. He has come and gone among our people, and if any man, woman or child has ever said aught against him, it has not come within my knowledge. We know that the great increase in taxes derived from these two structures has done more for our

County than probably any man can conceive. The value in material benefit to our schools, to our roads and to our general weal and welfare is due to the man whom we are all honoring here today.

"Not from the officials alone, not from the rich or the poor, but from all the people of Chilton County comes this tribute, not of great intrinsic value, but nevertheless a token of our esteem, just a small and humble way to show you—Captain William Patrick Lay—that we of this County feel especially grateful and proud upon this occasion and have felt it our privilege to present you this loving cup that you may always know and remember your friends back in Chilton County.

"Therefore, it gives me the greatest of pleasure to present this cup to the pioneer and leader in river development in Alabama; this cup comes from the hearts of the people of Chilton County, Captain, who will always be remembered by us and with this accept the felicitation of the donors, and may it in your declining years bring to you the knowledge that you have done your work well and the feeling that there are those who will never forget."

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